FOUNDRY TRADE JOURNAL

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AUGUST 17, 1961

Offices: John Adam House, John Adam St., London, W.C.2

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3' x 3' SHOTBLAST CABINET

SHOTBLAST ROOMS

SHOTBLAST CABINETS

BALE OUT FURNACES

LIFT OUT FURNACES

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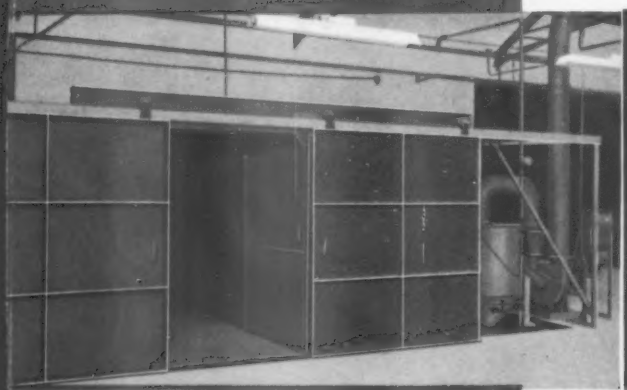
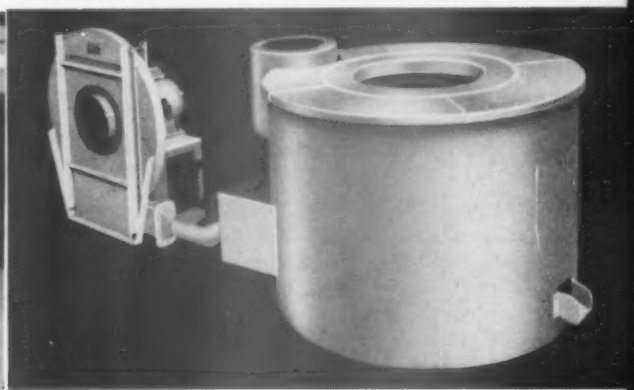


16' x 8' SHOTBLAST ROOM



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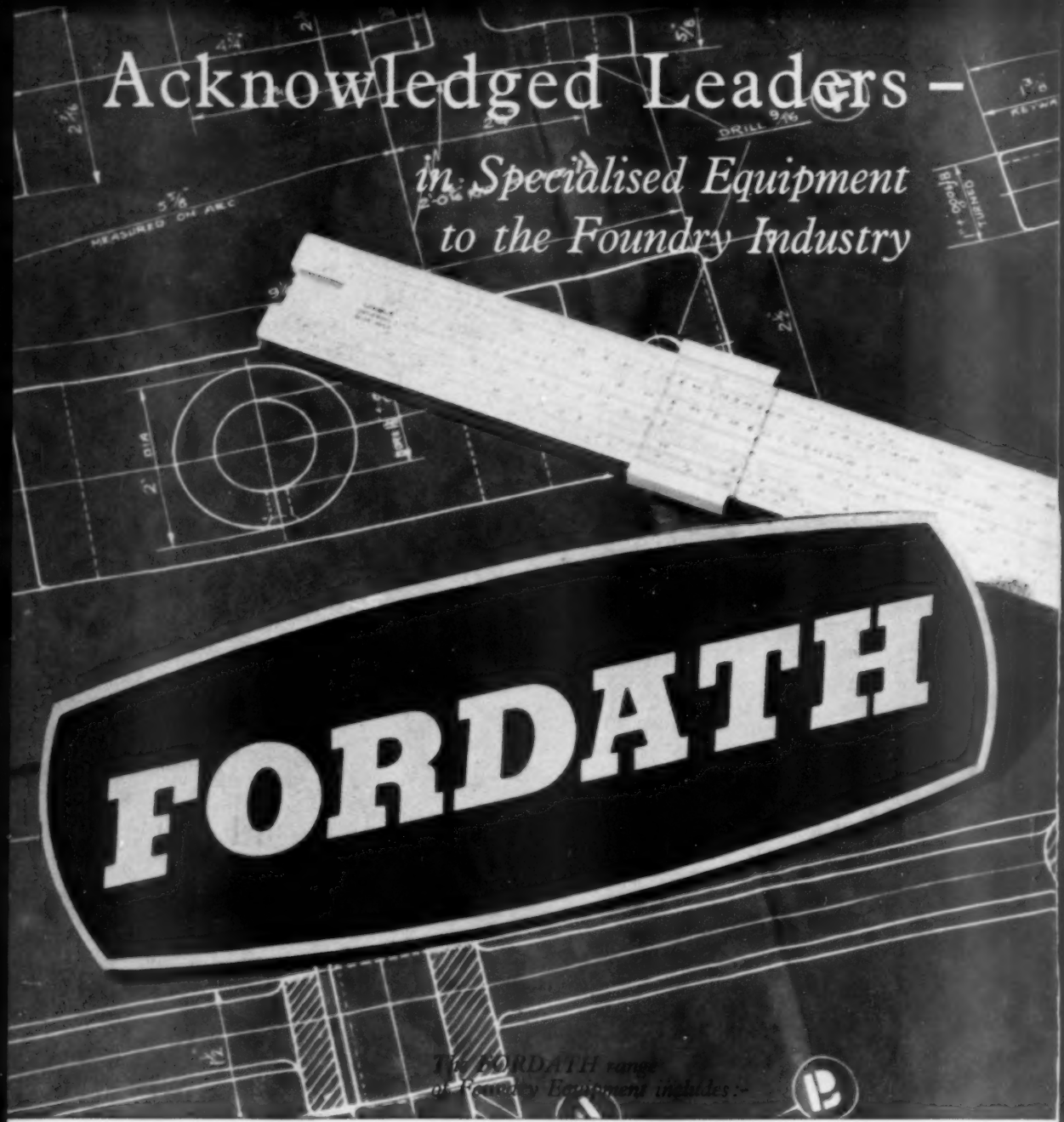

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RESIDUAL ELEMENTS

	%		%		%
Chromium	0.035	Titanium	0.020	Aluminium	0.015
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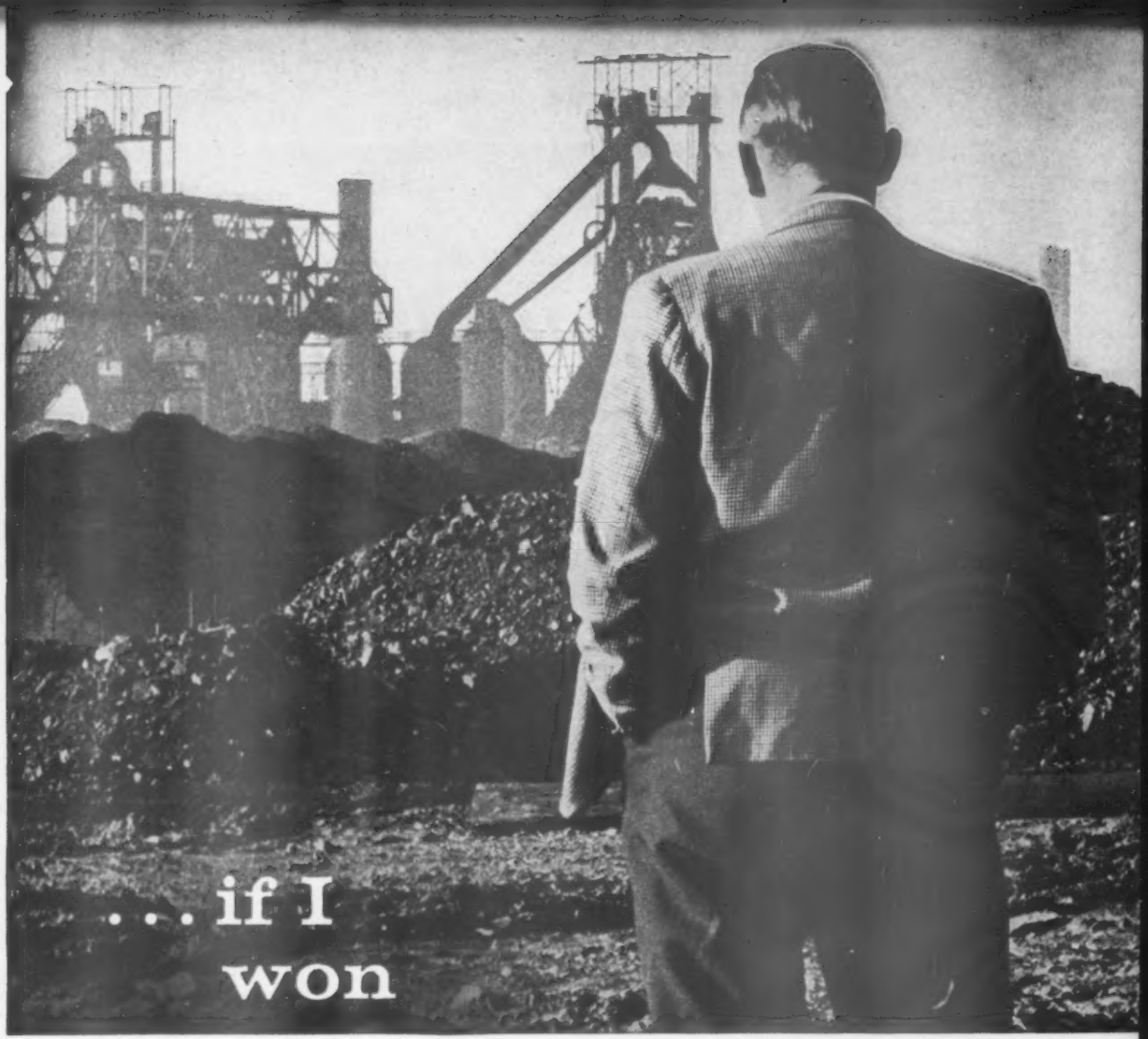

the pools

". . . and I might at that if a couple of teams I could mention were to buy themselves some decent centre forwards.

"Football is a funny game. One week a club is a world-beater and yet a few days later they can be licked to a frazzle by a team from a girls' school.

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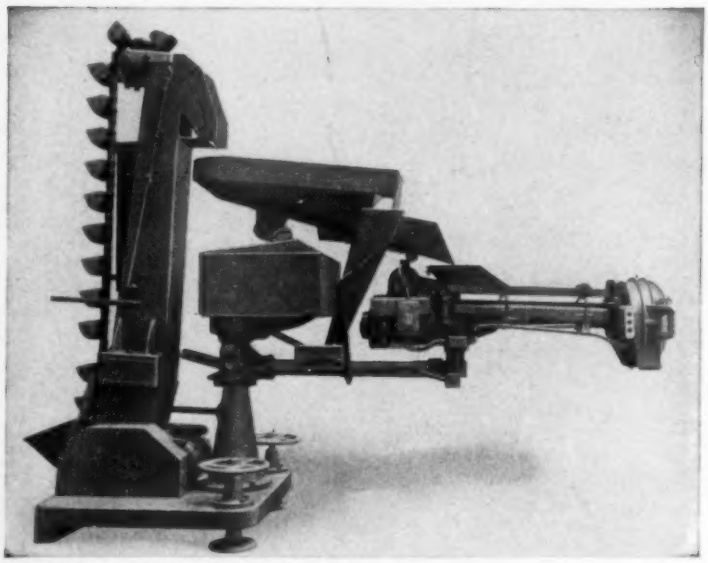

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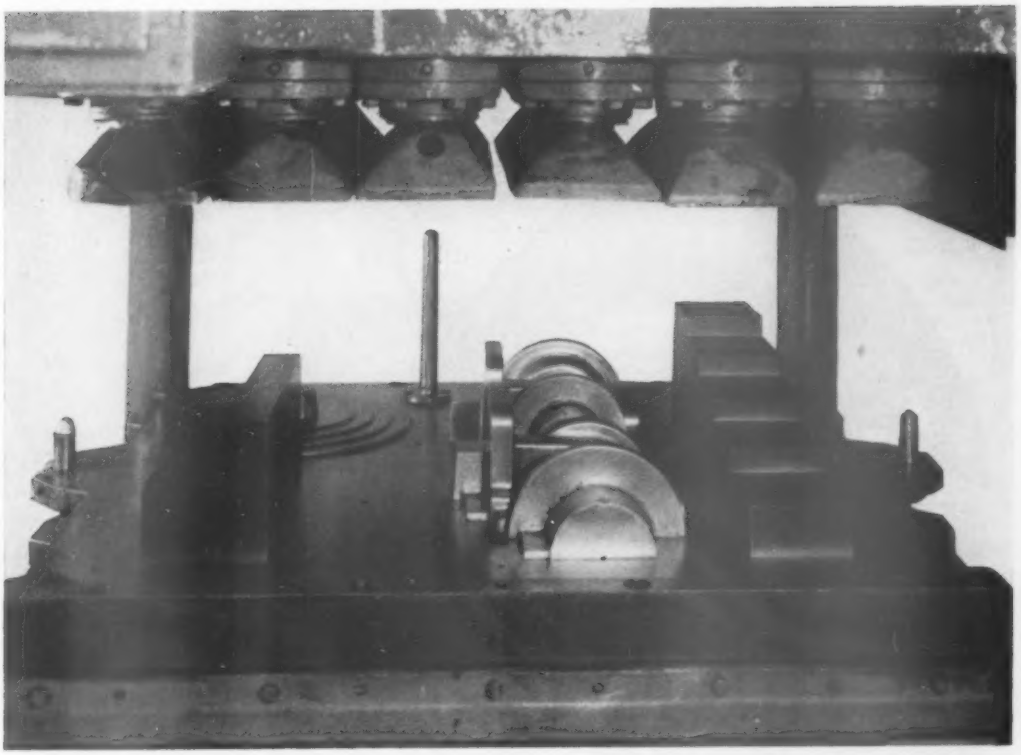

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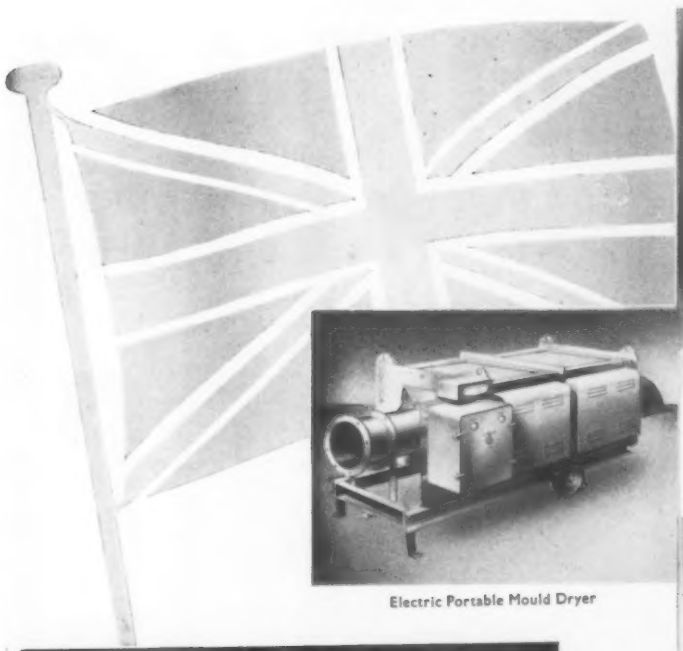

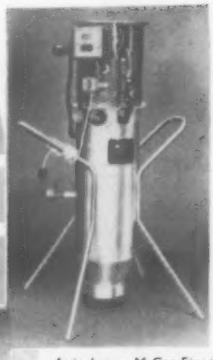

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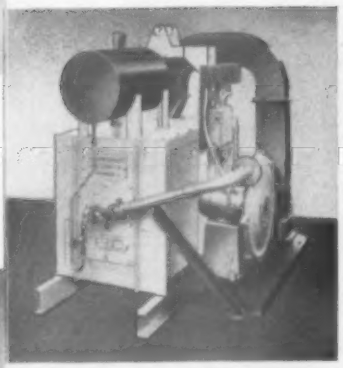
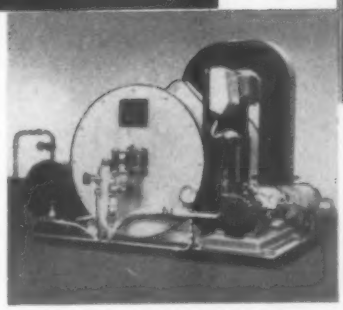


"Newstad" Oil Fired



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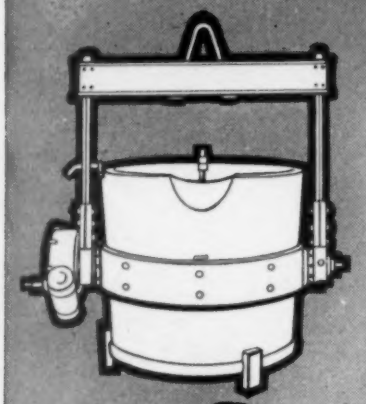

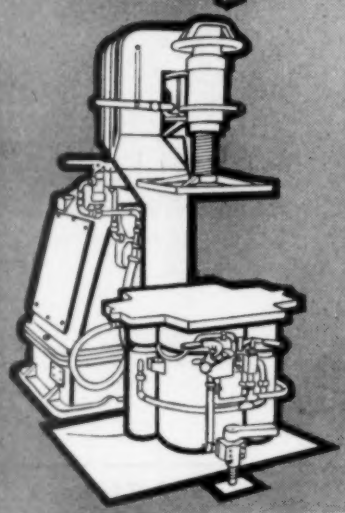

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COLLIN 10 tons GEARED FOUNDRY CRANE LADLE.
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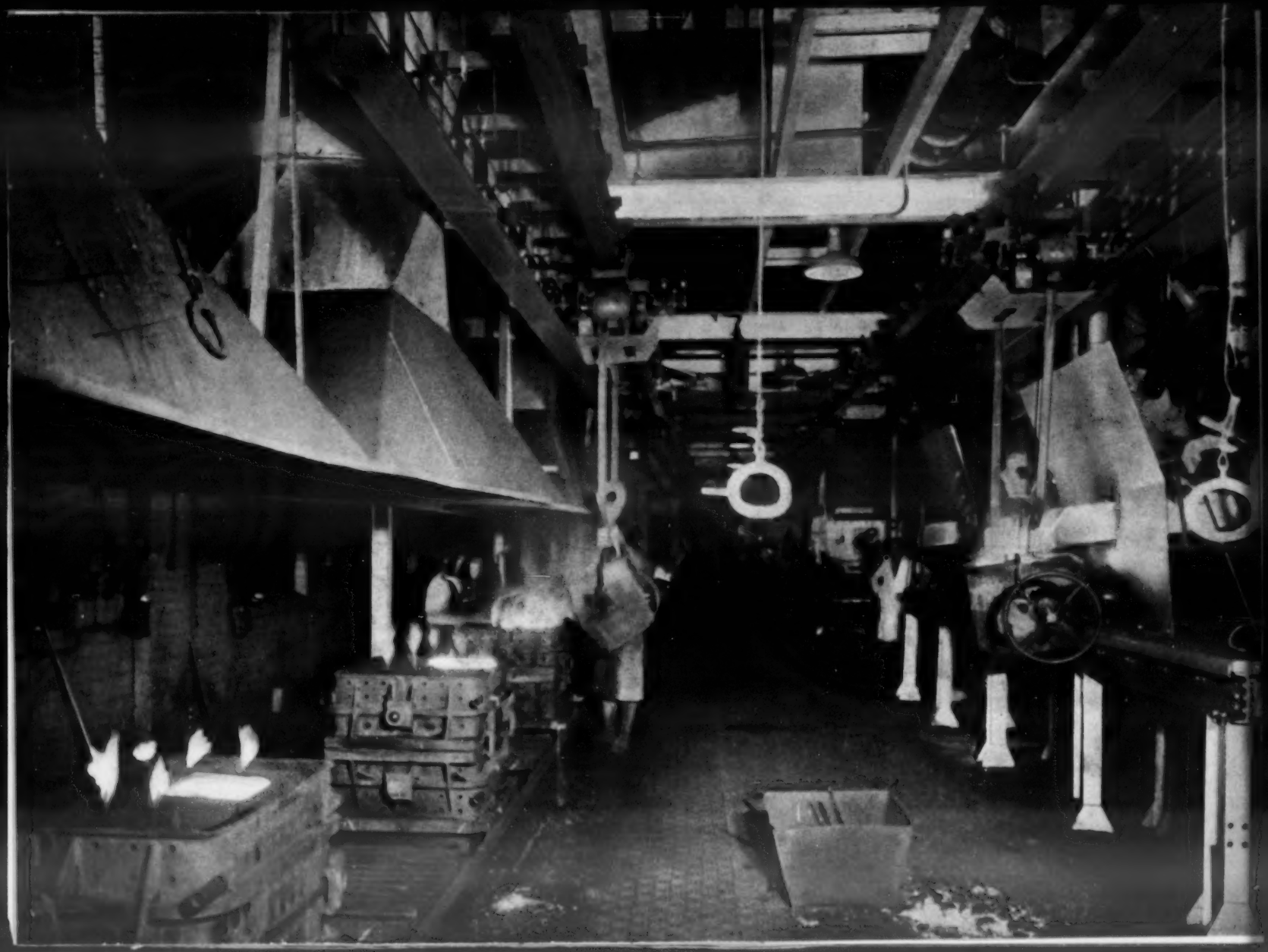
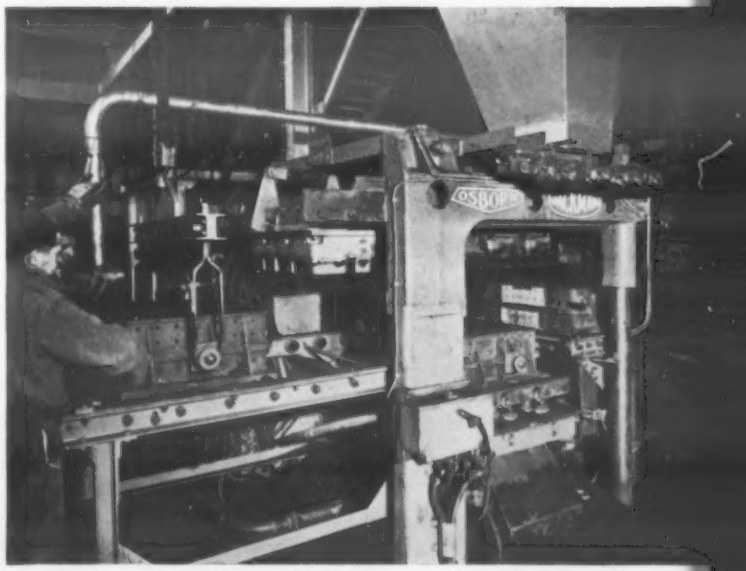
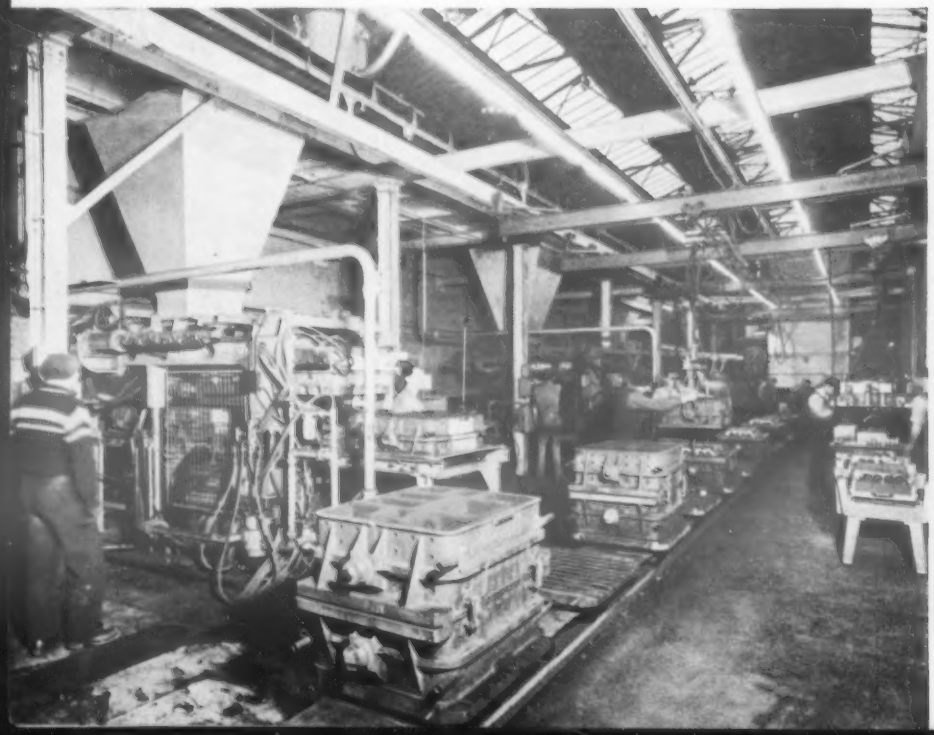


Sterling boxes help to build BMC parts at Wellingborough

Sterling boxes are used in conjunction with these new semi-automatic machines recently installed at Messrs Morris Engines Foundry at Wellingborough. The machines are capable of an output of sixty complete moulds per hour, and the boxes used are of the famous Sterling heavy duty type designed to resist very high moulding pressures and stresses, and ideal for operating in mechanised foundries.





Sterling
MOULDING BOXES

STERLING FOUNDRY SPECIALTIES LIMITED, BEDFORD.

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Many moulding sands have little plasticity even before use, and with most natural sands progressively less after each casting cycle. This is partly due to the presence of coal dust, ash and build-up of fines from dehydrated clay.

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Good plasticity is one of the advantages that synthetic sand users have over natural sand users, but it is fully appreciated that synthetic sand can only be used when it fits the practice and where suitable equipment for processing is available.

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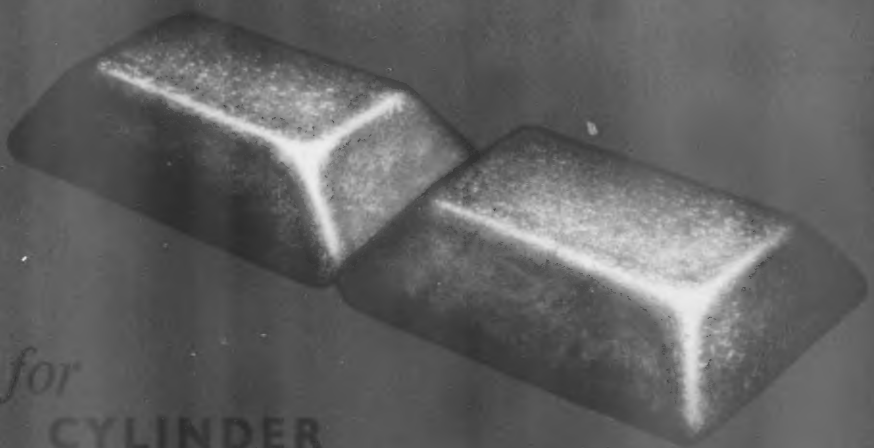

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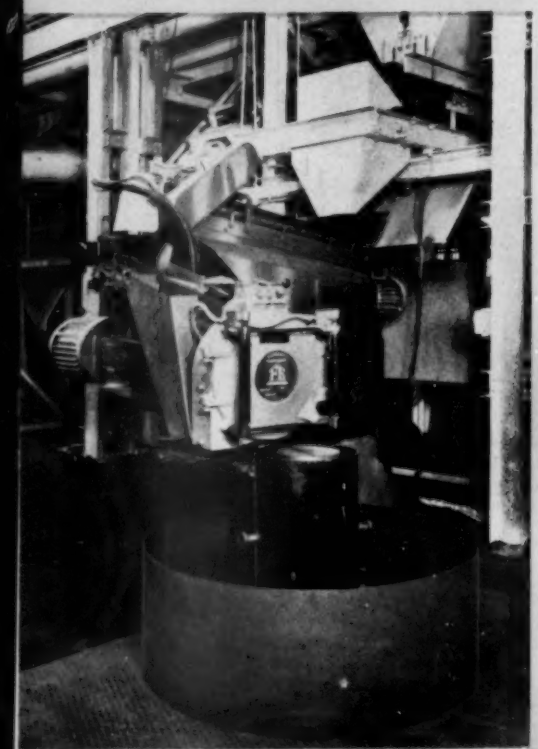
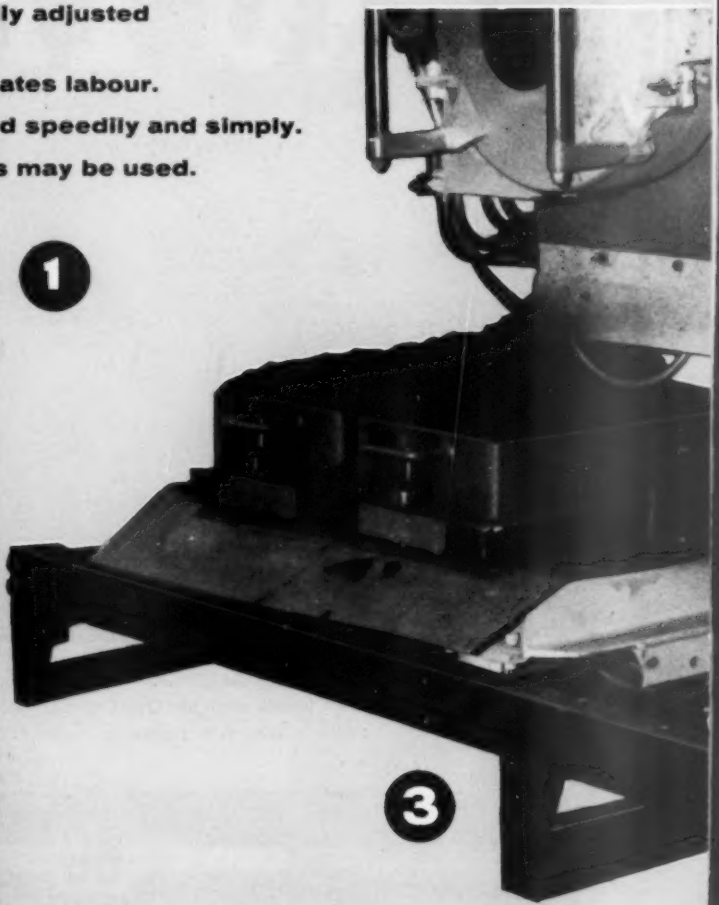
- Patterns and boxes changed speedily and simply.
- Existing boxes and patterns may be used.





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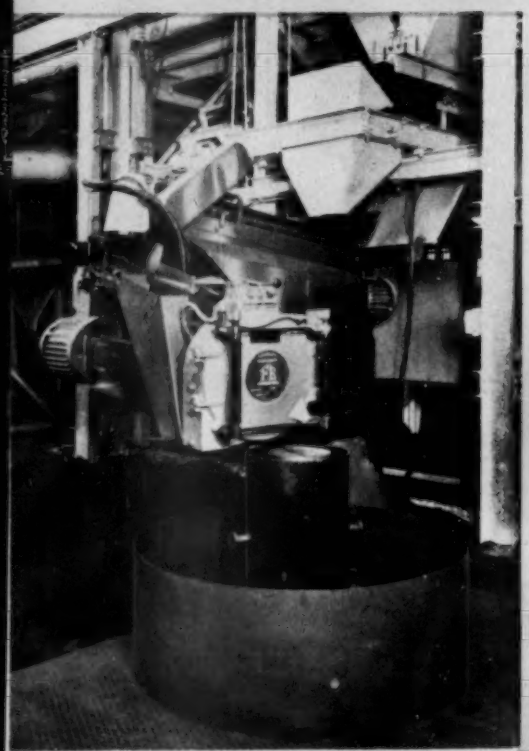

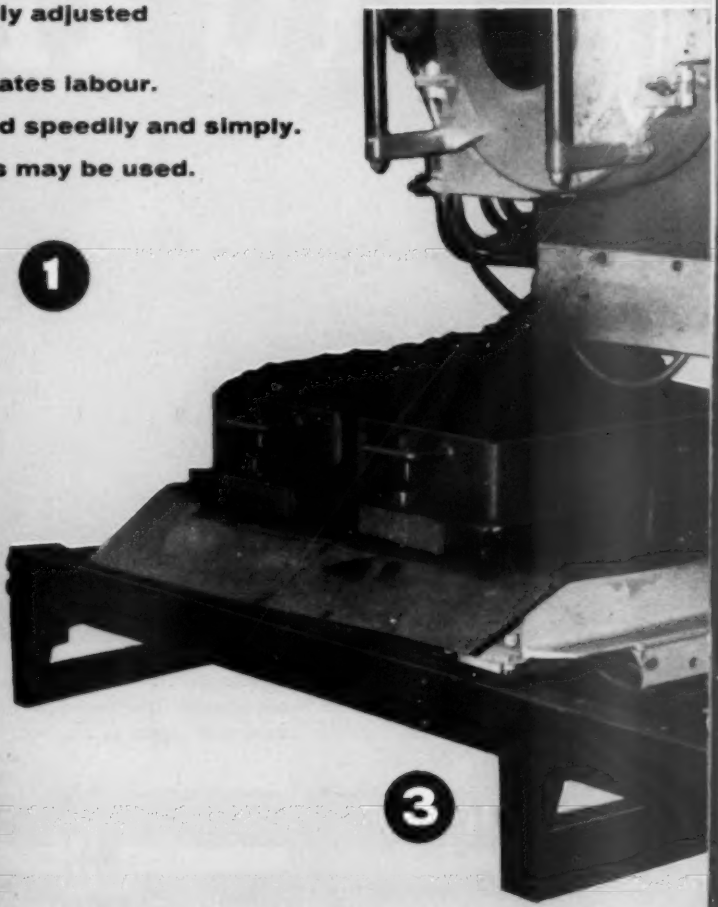

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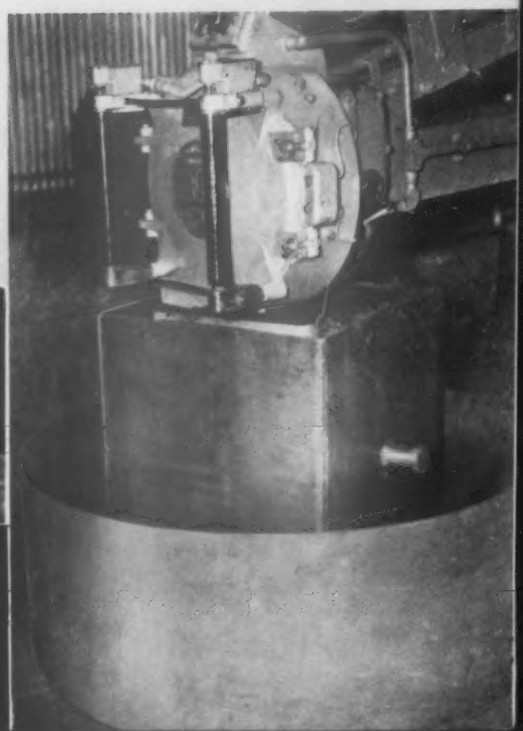

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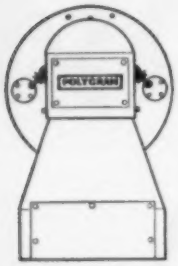
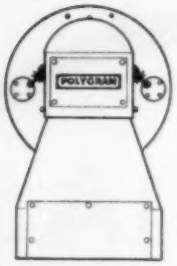
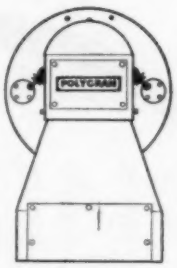


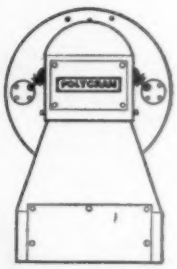
SHELL COREMAKING



SHELL MOULDING



HOT-BOX PROCESS



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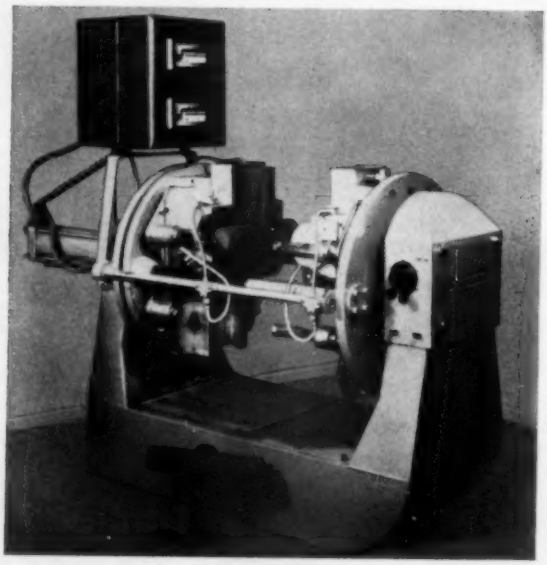
ONE . . . Polygram MANIPULATORS for SHELL COREMAKING



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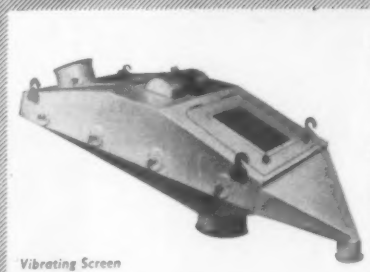

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Vibrating Crane Beam

vibratory equipment

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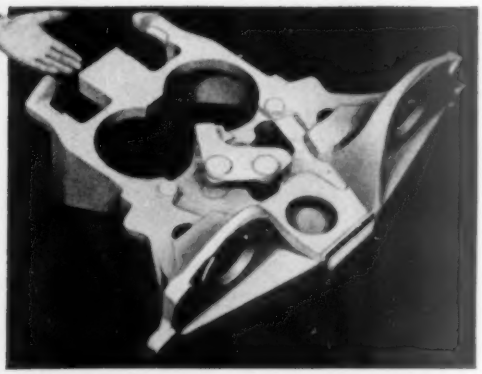

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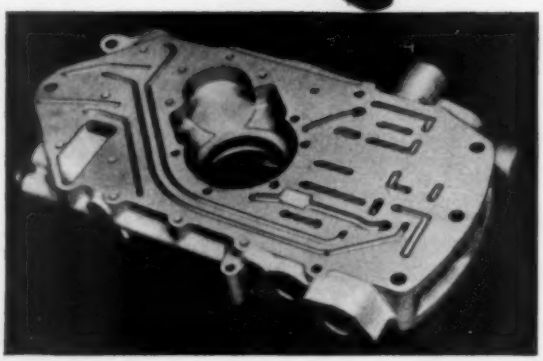

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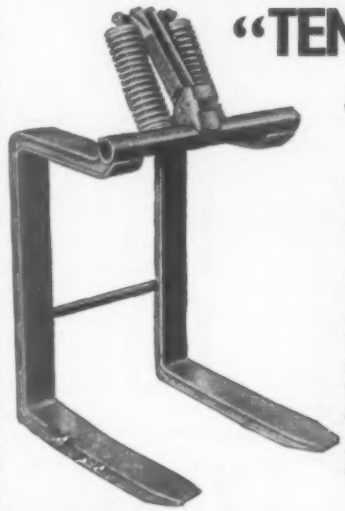

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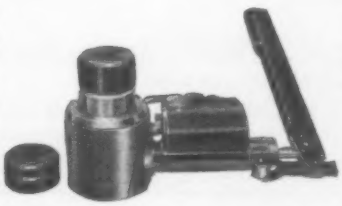

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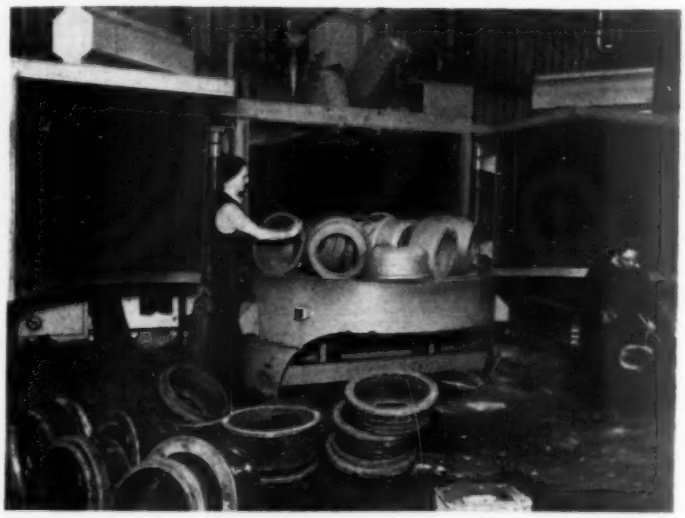

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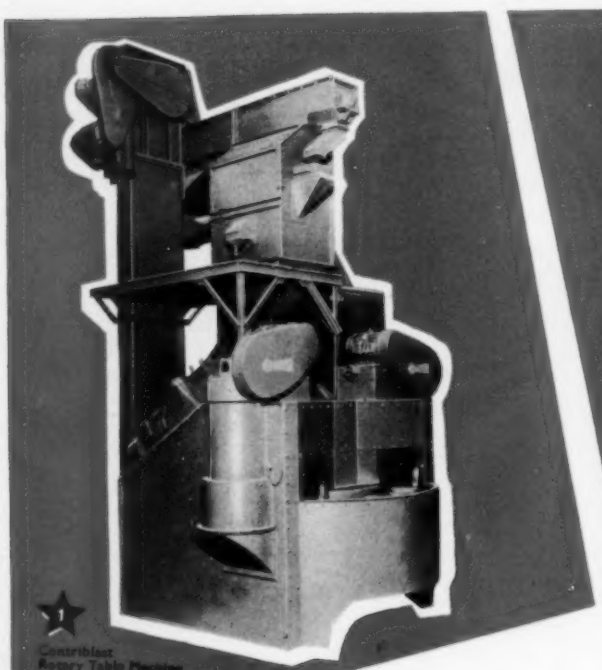

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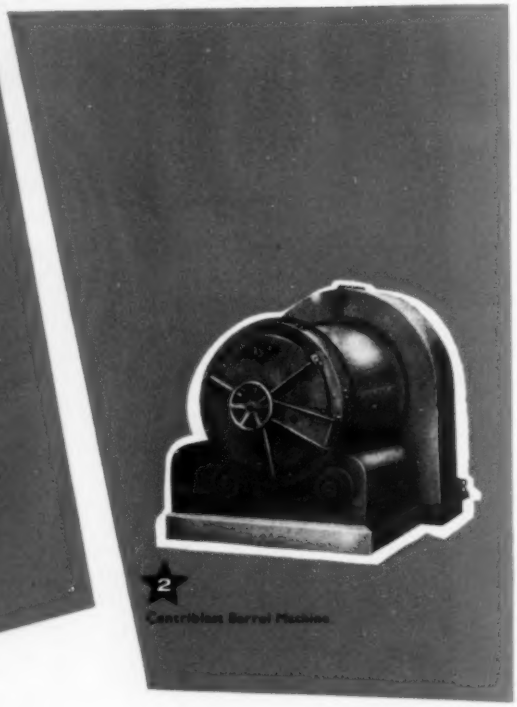

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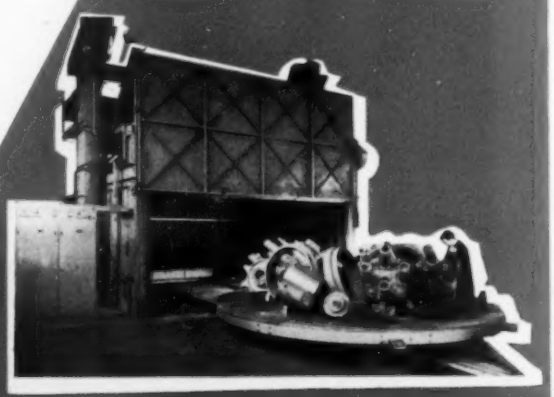

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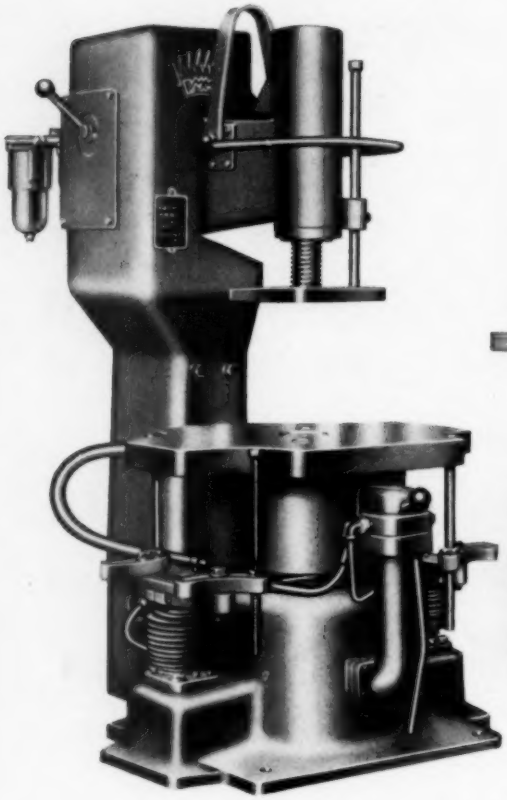

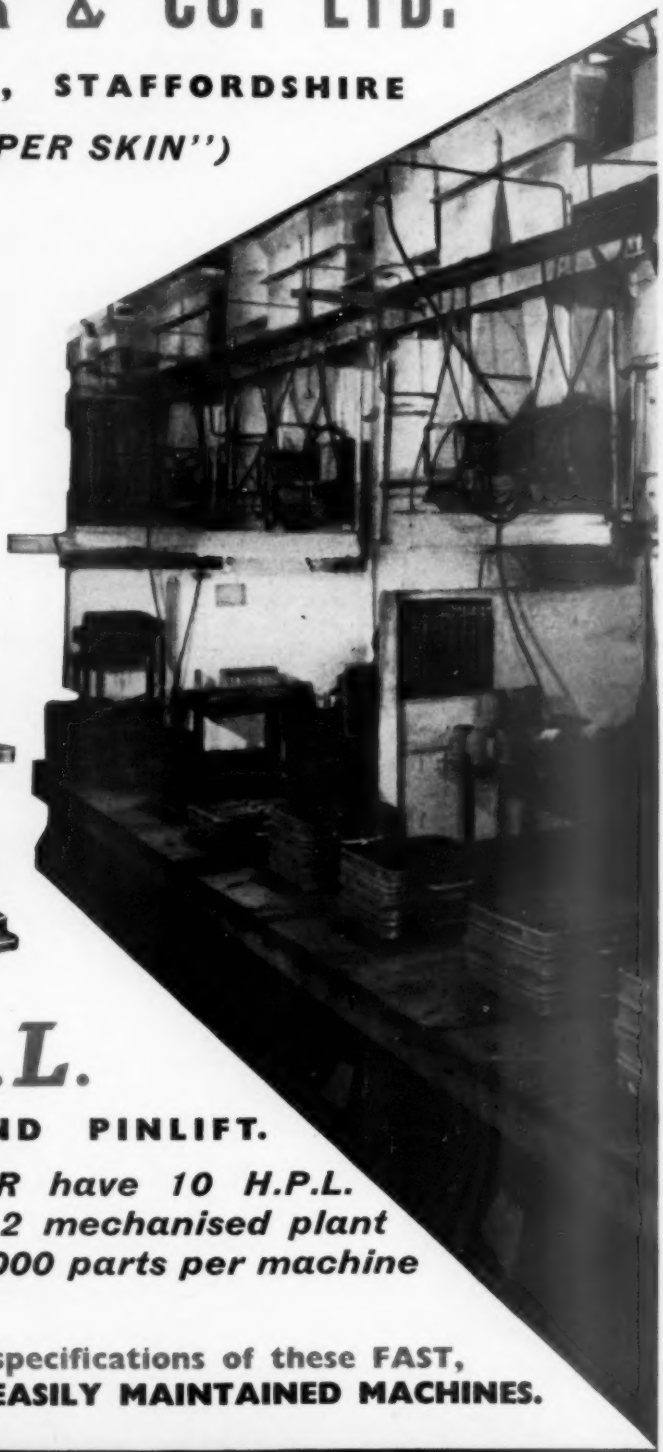

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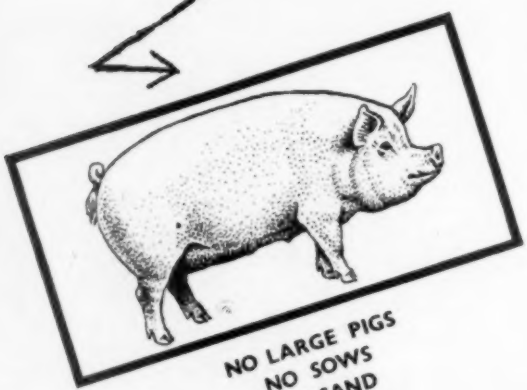

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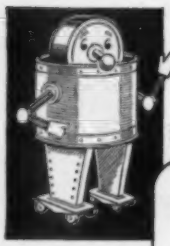

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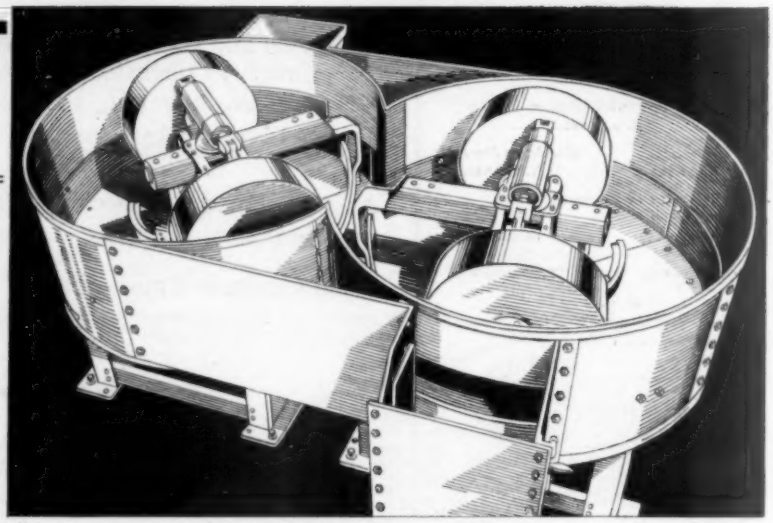

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FOUNDRY
TRADE JOURNAL
Vol. 111 August 17, 1961 No. 2332

Foundry Training Activities

Mr. Kenneth Marshall's letter on the above subject to the Editor of *The Times* was alike timely and important, yet no doubt on account of the need for compression, it was incomplete. He put forward five cardinal points, however, the first of which was the rehousing of the National Foundry Craft Training Centre at an initial cost of £20,000/£30,000, being raised by voluntary subscription. The training given there is not confined to ironfoundry apprentices, but is open for and used by all sections of the industry. Other activities stressed were the initiative of the foundry industry in the setting up of a Certificate of Craft Skill. Mr. Marshall also reported that the ironfoundry industry had produced a number of very useful publications and visual aids for teaching, had co-operated enthusiastically in the Commonwealth Training Week and had devised a foundry-technician training scheme.

It is important for any industry having recruitment and training of skilled men in view, to create a *cadre* within works of enthusiastic technicians. Thus, the Training Committee of the Council of Ironfoundry Associations, of which Mr. Marshall is director, has organized a number of residential training courses for supervisory staff of foundries at various executive levels. The number which has already attended these is impressive. Another activity not included in Mr. Marshall's letter is European co-operation, which has resulted over the years in the acquisition of detailed knowledge of Continental founding methods. This has not only been gained through participation in committee meetings with Continental colleagues, but also by participation in such events as international foundry apprentice competitions,* reciprocal works visits, and so on.

Mr. Marshall pointed out that the work of the CFA Education and Training Committee has received no publicity. This is true if viewed in the light of its omission from publications covering the whole subject on a national basis. However, it has, by its own effort, attracted much notice both in the Press and on the air in connection with the international apprentice competitions. Yet because the foundry group is of the type of employers' association which does not include within its activities negotiation with trade unions, it seems to be barred from recognition by sponsors of other schemes. The cost of educational activities to the UK foundry industry is considerable, probably they are much more expensive—and to our mind much more effective—than the efforts in other industries (with the exception, perhaps, of iron and steel). We hope as a result of the letter to *The Times*, proper and due recognition will be given in the future to our industry's training efforts.

* See page 208 of this issue.

Correspondence

To the Editor of the FOUNDRY TRADE JOURNAL

A FOUNDRY ENGINEERS' GROUP

SIR,—In this modern era with the increasing necessity for foundries to be efficient, the proficient engineer plays a major part in the planning, installation, maintenance and development of mechanized plants, with the necessary complicated ancillaries. Automatic moulding with new techniques merits research; instrumentation and process control are vital.

I would like to suggest—at first under a *nom de plume*, for obvious reasons—that the time is ripe for an "Engineers Group" to be formed under the auspices of the Royal Charter of the Institute of British Foundrymen (this being the natural parent body). Here on a national basis a lot could be achieved in the way of symposiums, conferences, co-operation with the plant engineering research departments of the British Cast Iron Research Association, the British Steel Castings Research Association, the Non-Ferrous Association and work on foundry engineering standards, etc.

It would be interesting to have the reactions of your readers.—Yours, etc.

ENTHUSIASTIC ENGINEER (FOUNDRY)

ISI Meeting in America

The Iron and Steel Institute is holding this year its first special meeting in America since 1904, from October 17 to November 8. The Metallurgical Society of the American Institute of Mining, Metallurgical and Petroleum Engineers will be the hosts to the 270 members and ladies taking part in the meeting, and the American Society for Metals has also extended an invitation to members and ladies to attend the annual congress and banquet and the Metals Exposition in Detroit. In addition to the programme of works vists, there will be a number of social functions. Members and ladies will be guests of the United States Steel Corporation, Union Carbide Corporation, the Canadian Steel Companies, Republic Steel Corporation, National Forge Company, and the Association of Iron and Steel Engineers at receptions and dinners, and an extensive sightseeing programme has been arranged for the ladies.

New Export Club

In an attempt to encourage exporters to meet in a social atmosphere and exchange ideas, an Export Club is to be formed at Northampton. An inaugural luncheon meeting will be held in the Angel Hotel, Bridge Street, Northampton, on October 12 and periodical meetings are envisaged for the future. The Club looks to all exporting industries, including the foundry industry, for members, and membership is open to all persons, including ladies, from junior clerk to managing director, in whatever branch of the export trade and allied trades they are engaged. Principle guest at the inaugural luncheon will be Mr. A. J. M. Crichton, joint chairman of the National Joint Council for the Port Transport Industry.

A NEW DOLOMITE MINE which will help Hungary to cut imports of magnesite furnace bricks has been opened at Ujmassa, in northern Hungary. It is estimated that the new mine contains twice as much dolomite as a former working in the district.

British Standards Institution

Sampling and Testing Insulating Refractory Bricks

In a new British Standard (B.S.2973:1961) which deals with the classification, sampling and testing of insulating refractory bricks, the foreword points out that the first consideration in selecting the most appropriate insulating refractory for any application must be the limiting service temperature. For any given limiting service temperature, the values for other properties may differ in materials of different manufacture and the refractory material should be selected with the combination of properties most suitable for the application in question. The system of classification specified in this standard is based on the behaviour of the refractory material in the permanent linear change test conducted at a specified temperature. The method of determining the permanent linear change is given, there is a page on sampling, and methods of determining dimensions, warpage (which includes convexity and concavity), bulk density, cold crushing strength, modulus of rupture, and thermal conductivity are given.

Determination of Air Pollution

When B.S.1747, The Determination of Air Pollution was first published in 1951 it was concerned solely with deposit gauges. Now it is being re-issued in several parts to cover, in addition, apparatus and procedure for the measurement of (1) fine particles (smoke), and (2) gaseous impurities, as well as the solid material (such as grit) which is measured by the deposit gauges specified in Part 1 of the standard recently published. Experience in the use of deposit gauges during the past ten years has enabled the British Standards Institution committee concerned to introduce a number of refinements into the standard but the procedure outlined is substantially unchanged. The standard deals with the construction, installation and use of deposit gauges, also included are a standard report form and a statement of the analytical determinations to be made.

Back Boilers

Materials and constructional requirements for back boilers for use with domestic solid-fuel appliances are laid down in B.S. No. 3377:1961. Boilers for independent domestic hot-water supply or central heating are not dealt with, as they are already covered by other British Standards. Another new standard, B.S.3385, lays down requirements for direct reading personal dosemeters for X- and gamma-radiation.

Copies of these standards may be obtained from the British Standards Institution, Sales Branch, 2 Park Street, London, W.1; prices respectively 6s., 5s., and the last two 3s. each, plus postage.

Revised Standards

BSI News, the official organ of the British Standards Institution, announces under Revised British Standards, No. 779:1961 Cast-iron boilers for central heating and hot-water supply (15s. plus postage) and No. 1189:1961 Cast-iron baths for domestic purposes (6s. plus postage). The latter standard covers five sizes of baths.

IN CONJUNCTION with its Spring Meeting, in Buxton, Derbyshire, from May 2 to 4, the Institute of Welding is organizing its first Welding Engineering Exhibition. Potential exhibitors can obtain details as to cost of space etc., from the secretary of the Institute, 54, Princes Gate, Exhibition Road, London, S.W.7.

Introducing and using Work-study in Steelfoundry Operations*

By H. W. Keeble, F.I.M., A.M.I.Mech.E., and R. F. Rankin

The paper opens with a reference to the increasing cost consciousness in the industry and the part work-study can play. The origin and development of work-study is then briefly reviewed. This is followed by a consideration of methods study and work measurement as the two components of work-study. Important factors bearing on the introduction of work-study are referred to including the character and selection of the work-study engineer. Under the heading of "Using Work-study" it is suggested that applying work-study to indirect operations may be helpful having regard to the present state of the industry. The results of the application of work-study exercises in two spheres of indirect activities are then described. The paper concludes with an emphasis on having a perpetually-questioning attitude in carrying out studies.

The steelfounding industry in general terms is in a period of under-employment of total capacity, certain costs are rising and sale prices are relatively stationary. Consequently, profit margins are being squeezed which in turn increases attention to costs generally.

The aim of work-study is to secure the most-effective use of human effort and equipment. In other words, to improve productivity and reduce cost per unit of production. Work-study is organized commonsense intensively applied in a logical sequence to a given area of operations.

History

Work-study in its basic principle is as old as industry itself. Records show that in the late eighteenth and early nineteenth centuries work-study principles were being applied in Great Britain and France in making the humble pin, certain textiles and china goods. Later, Tayler in the USA (who, by the way, started as a patternmaker) determined the principles of work measurement. Concurrently, the Gilbreths (husband and wife—industrial consultant and psychologist respectively), also of the USA, stimulated by Tayler's work, developed "motion study" to determine the most effective and economical method. Thereby laying the foundations of methods study as we know it to-day.

On the work of Tayler and the Gilbreths, another USA consultant—Bedaux—introduced an amendment to work measurement procedure by including personal rating and allowances for various factors. Work measurement by Bedaux principles was introduced into this country in the late 'twenties. It met with considerable opposition for a number of reasons, mainly because of the trade position in the early 'thirties and the senseless way in which it was often introduced and used. Since 1945 and particularly in the 'fifties there has been an evolution of these procedures into a balanced force now increasingly recognized for its practical worth. Additionally, there is increasing interest and understanding by the trade unions of the part work-study in its current form can play in improving productivity and earnings.

Scope

Work-study technique involves two procedures—methods study and work measurement. Methods study establishes the best way of doing a job and work measurement determines the time taken to do it. Both procedures are complementary and interdependent. Methods cannot be improved unless they can be measured; equally, standard times cannot be applied unless the method is defined. At this stage it is pertinent to point out that the term "methods" in the steelfoundry world has local significance in that it usually refers to the study of the joint line of the pattern, feeding, gating and chilling systems relevant to moulding, coring and closing on the one hand and soundness of the casting on the other. In the context of work-study, methods study relates to the overall activities by which the casting is made. In the Authors' organization there is a methods department doing the work previously defined. Our methods study activity in work-study exercises is carried out from our production study department.

Work-study is not a magic wand. Indeed, it can readily cause open and concealed trouble if close collaboration of staff and workpeople (the former as much as the latter) is not established *before* it is introduced and continuously maintained thereafter,

* Paper presented at a one-day conference on "Work Simplification in Steel Foundries," organized by the British Steel Castings Research Association. The Authors are respectively director and general manager and head of the production study department, foundry division, K. & L. Steelfounders and Engineers, Limited, Letchworth. An abstract of this paper appeared in the July 27 issue of the JOURNAL, page 98.

FIG. 1.—*General view of racks with smaller-pattern boards above and medium-size boards at ground level.*

Further, in some cases of application the studies may be long and difficult, requiring a lot of data for critical assessment before the pattern of possible improvement emerges—if at all. Finally, to be really successful, the concept of work-study and implication of results arising therefrom must be accepted and encouraged by all concerned and not regarded as a semi-private exercise of a particular man or department. This includes the worker on the floor and all the way up to the top. Details of the technique employed, the language used, the instruments involved and method of assessment and expression of results may be ascertained from the literature quoted in the appendix to this paper.

Nature

The foundry industry is a particularly good subject for work-study because of its character and history. The nature of its operation makes it essentially a materials-handling activity. According to the character of the work, between 100 and 200 tons of materials are handled in the foundry operation to get one ton of castings through the despatch door. Movement of sand, liquid and solid metal, patterns, moulding boxes, general stores and equipment comprise this massive load. In this *mêlée* of movement work-study, particularly the method study approach, can make significant contributions.

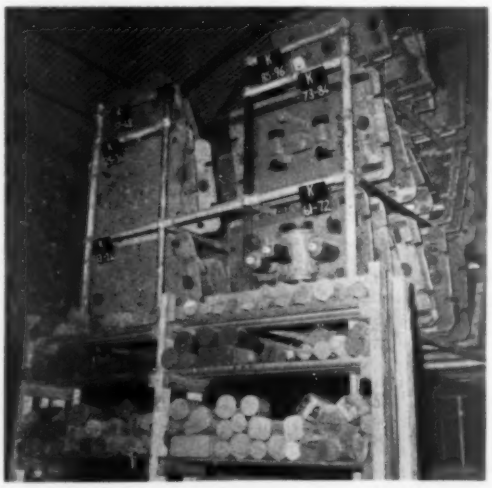
Work-study (methods study/work measurement) will produce results which can be extended into: (*a*) Incentive schemes for direct and indirect workers; (*b*) indicate correct production capacities, and (*c*) help in the appraisal of revised layouts and new equipment.

Consequently, where in the company set-up the work-study engineer is based, is largely influenced by the character of the administration and by the strength of the intent to use the techniques. Humanity-at-large does not like change, particularly sudden change. Consequently, unless all involved are prepared to face up to making changes which work-study will indicate then it is fruitless and frustrating to attempt to use it.

Confidence in why it is being used, how the studies will be made and how the results of the studies will be used to make changes must be established at the outset. In this matter quite apart from the character or climate of the relationship which normally exists between the work-people and its management there is an outstanding necessity for the work-study engineer to be of balanced personality and known integrity, whatever his technical and craft background and I.Q. level! For these reasons it is felt by the Authors that wherever possible he should be appointed out of the existing staff. Training in work-study technique can be given in a relatively short time at one or other of the centres indicated on the circular recently sent out by the British Steel Castings Research Association. Introducing an outside man—fully trained (if he can be obtained) brings an unknown man in whom confidence and acceptance has to be built up which often takes considerable time. Mistakes or confidence difficulties cannot be afforded in the initial stages of introducing work-study, as they will cause endless troubles which take a long time to remove.

The Authors know of no tool for the improvement in costs and man hours per ton of finished castings which requires such little capital expenditure (office accommodation) on such short delivery (say eight

FIG. 2.—*End view of racks—featuring loose-head storage—which are partially colour-coded against job number.*



weeks' basic training) with moderate running and depreciation costs (salary and superannuation) as is involved in appointing work-study engineers.

Practice

For several years, until recently, the effort in steel foundries has been to secure an extra increment of production above what may be termed normal capacity. This extra production has been gained in many cases at cost of disproportionate increase in services which however, was acceptable under the circumstances. Direct-floor-activity levels are obvious and can be regulated. Without work-study indirect-floor-activity levels (mainly services) are much more difficult to assess and once accepted against a previous high norm of activity often require continuous and careful attention to secure adjustment without loss of efficiency and morale. Whether work-study has been in use or not it is likely at the present time that the most rewarding results with less complications will be obtained, by tackling the services rather than the direct production areas. Where work-study is being introduced for the first time the Authors would recommend its application in the service areas where experience by the work-study engineers can be gained, confidence built up and where usually individual earnings are not affected. These services include among others, inside transport, pattern movement, stores movement, housekeeping services, etc.

In the following notes broad details are given of two work-study exercices on indirect operations which results in improved services at lower costs.

Pattern Movement

In the Authors' foundries approximately 250 patterns and 1,850 coreboxes are in production each week. As in most foundries there never seems to be sufficient pattern storage facilities and consequently some pattern equipment has been on occasions scattered in miscellaneous "temporary" storage areas apart from the main stores. Pattern movement in these conditions involved several men and vehicles and it was the responsibility at that time of the pattern shop to get the patterns in and out of the foundry against loading programmes. They worked in liaison with production control department on the one hand and foundry supervision on the other. This resulted in mixed responsibility and overlapping in the resources employed. At this time further pattern-storage area was made available and a work-study engineer was given an assignment to study pattern storage and particularly pattern movement. The study took eight weeks and a further four weeks to examine the data and make recommendations for a revised procedure most of which was put into effect. This took about six months to introduce fully as continuity of patterns service was necessary for obvious reasons. The recommendations included changes in departmental responsibility for control, a revised card-index system and re-location of some storage racks. The advantages gained were: (*a*) Pattern movement team strength reduced from 11 to eight; (*b*) one truck instead of two for transportation; (*c*) reduction in lost loose-pieces and heads necessitating remaking. Figs. 1, 2 and 3 which are self explanatory show the final storage arrangements with gangway for powered movement, etc.

FIG. 3.—*Storage of large boarded patterns under crane, with walkway.*

Core Jointing and Storage

In the Authors' light foundry there is a powered band conveyor feeding the core stove (continuous vertical-type) with cores made at benches and at right angles to the conveyor. On the unloading side of the stove there was a number of tug stillages and bench facilities for jointing and gauging. There was no organized form of working at the exit side due to the variety and sequence of the cores coming through. It was realized by all this was an untidy and wasteful set up and a work-study engineer was assigned to study the subject. Fig. 4 shows a general view of the area looking away from the stove at the unloading side. The study showed that if operators working on core jointing were given improved work benches in revised positions more work could be done with less fatigue, that much time was spent on carrying cores around while majority of stillages originally provided were left unused, that the stove unloader was walking about 10 miles per shift and finally that a great deal depended upon batch loading instead of single loading at the entry side of the stove.

Revisions to the method of working were formulated, they were discussed with all concerned using string diagrams to illustrate the proposals; new work benches were designed and installed relative to the proposed flow line of movement;

FIG. 4.—*General view before reorganization of core-jointing and storage area looking away from the drying stove at unloading side.*

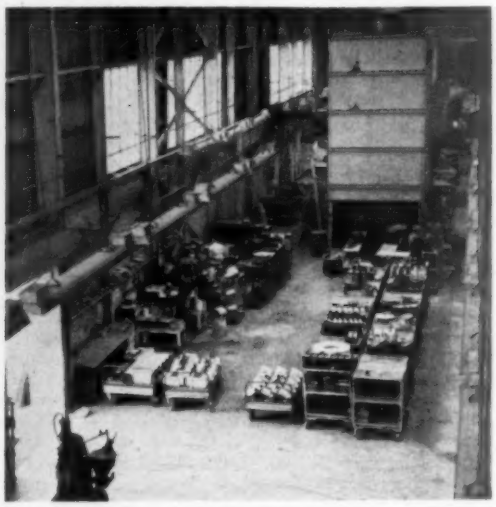


FIG. 5.—*General view after reorganization of core-jointing and storage area looking towards the stove.*

buffer stillages were introduced at the loading side of the stove to give batch flow at exit side, and the core stillages were made more portable by conversion from two to four wheels. For larger cores new four-wheeled castor-type stillages were introduced and the bases covered with foam rubber. The result of these alterations was a much cleaner layout, flow-line movement of cores, no cores on the floor—all on stillages which much improved the service to the moulding sections, much reduced breakages and finally the working floor space was reduced by 1,000 sq. ft. for the same through-put of cores. The unloader now walks about four miles per shift! Fig. 5 shows the shop layout after the work-study exercise. The view is looking towards the stove.

Conclusion

In conclusion it must be emphasized that in work-study there must be a perpetual attitude of "why" about every operation in order that elements in a situation arising largely from bias and tradition may be filtered out. Kipling provided the signature tune of the work-study engineer in his famous lines:—

> "I keep six honest serving men
> (they taught me all I know)
> Their names are What and Why and When
> And How and Where and Who."

Appendix

The following literature is recommended:

(*a*) British Standard Specification No. 3138; (*b*) Work Study by R. M. Currie—price 22s. 6d.; (*c*) Conference on Work Study—May, 1954, published by British Institute of Management—price 7s. 6d.; (*d*) Outline of Work Study—parts 1, 2 and 3, published by BIM—price 7s. 6d. parts 1 and 2, and 12s. 6d. part 3.

Pearlitic-malleable Shells for US

The Detroit Ordnance District announced last month (July) that an order for 173,800 rounds of 81-mm. mortar shells has been awarded to the Albion Malleable Iron Company. This is said to be the first quantity supply of artillery shells cast from pearlitic-malleable iron. Advantages in making shells from this material are said to stem from good machining-properties, resistance to fracture, metallurgical flexibility and corrosion resistance, and army ordnance officers also stress its lower material cost compared with steel. Ordnance officials have also stated that they were pleased with the fact that the metallurgical composition of the cast iron could be altered at will in a continuous production operation so as to produce a wide range of special-purpose warheads. Improved control methods of melting permit the use of a relatively high-silicon and low-carbon content in the metal to accelerate annealing, plus the elimination of large amounts of packing materials. A new inspection tool based on ultrasonic principles, used by the Albion Malleable Iron Company, is claimed to reject unsound castings, quickly, economically and automatically.

CISITALIA ARGENTINA SA has been authorised by the Argentine Government to invest $628,900 in machines, equipment and tools for a new plant to produce automobile engines and parts. The new plant will be established by Cisitalia Autocostruzione, Limited, Giustina & Cia, Gatti & Cia, Abarth & Cia, Fiara Forniture Industriale Accesori Ricambi Auto and Pistone Ae Borgo.

European Foundry Apprentice Competition, 1961

Details of Arrangements Tests set, and Comments on the Event

Candidates grouped before the entrance of Krauss-Maffei Limited, at whose well-equipped apprentice school the Competition was conducted.

The British team was again placed last behind those of Germany and France in the Fourth European Foundry Apprentice Competition which was held in Munich from May 15 to 19, 1961. Edward White of Le Grand Western Foundries, Limited, who achieved the best individual British result, was placed seventh out of 16 competitors, though he obtained the highest marks on the written papers. Competitors came from eight countries and the German competitors took the first three places followed by three French boys. It is, of course, dangerous to draw general conclusions from these figures or from the fact that no British competitors, nor British team, has yet won the competition. Marks are weighted heavily in favour of practical ability (100 out of 170 possible points are given to the practical test) but a reasonable standard of calculations, drawing and technology is also required. The official and national training schemes of the Continental countries, in particular France and Germany, include compulsory technical education which is formally integrated with practical work. It is, therefore, natural that they have a wider reservoir from which to find national representatives through their own home competitions. There are, undoubtedly, many apprentices in this country with the necessary practical skill but who would fall down on the written papers.

Drawing

As on all other occasions, the test questions had been previously vetted by a European panel of judges, drawn by lot, and kept in sealed envelopes up to the morning of the Competition. The three British judges, Mr. J. Bamford of the National Foundry College, Mr. G. H. Charsley of Trent Foundries, Limited, and Mr. P. D. Pincott of Erifo, Limited, were present when the seals were broken and for the rest of the week had a busy time invigilating, marking and supervising arrangements. On Monday morning, Edward White, Morris Rosendale (K. & L. Steelfounders) and Angus Morris (Wallsend Slipway Engineering Company, Limited) faced a drawing test, which turned out to be the British submission, in the superbly-appointed apprentice school of Krauss-Maffei, Limited (Fig. 1). This company, which is just outside Munich and produces mainly locomotives and buses, acted as generous host to the Competition. The test itself, shown in Fig. 2, was a pump body and presented no undue difficulties. Candidates were required to draw views of pattern and cores.

Technology

After lunch, during which our boys were warned of the hidden strength of Bavarian beer, the technology paper was taken. It consisted of five short-answer questions, two of which could be done by simple sketches, and one longer essay type question in which the candidate could show his practical foundry experience. Candidates and judges came back to Munich at 7.30 p.m. on the Monday after having left their hotels at 6.45 a.m. in the morning.

Practical

The whole of Tuesday and Wednesday morning

FIG. 1.—*Apprentice Training Centre of Krauss-Maffei, Limited, with invigilators (including Mr. Pincott—facing camera—of Erifo Foundry) at their posts for supervising the drawing test.*

were taken up by the practical test (Fig. 3), in which candidates had to make a gear box. The casting was difficult, being made as a five-part job with a flat bottom plate whose dimensions were very close to the box dimensions. The main trouble with the castings produced by British competitors was swelling on the bottom flange, mainly due to insufficient ramming of the quite-tough sand. Having a fairly-tall structure the ferrostatic pressure on pouring was considerable and presented one of the "hidden" difficulties. The majority of foreign competitors finished their cores and moulds better than the British candidates and as a result their castings possessed a better surface finish and presented a better appearance.

Facilities

The facilities were not on the level of those experienced in the two previous competitions in Paris and the Midlands. Though the patterns worked well there were not sufficient of them for all competitors and those who made cores while the others made moulds had something of an unfair advantage in the rather confined space of the shop. Though cores were well dried all moulds were cast green, even the one for the non-ferrous casting. German television operators showed a little less consideration for the competitors than had been shown in the Midlands.

Calculations

The calculations paper was taken on Wednesday afternoon (Fig. 4). This was the first time that a serious attempt had been made to provide identical calculations for those working in the metric and the British systems. It proved to be a great advance and results were very reasonable.

The competitors' part was thus concluded on the Wednesday evening and they, together with judges and observers, were entertained to a traditional Bavarian meal by the Lord Mayor of Munich in the "Ratsstube" of the Town Hall On Thursday, the boys went on a coach tour and then by cable car to the top of the Zugzpitze. The weather was kind and it proved to be a most enjoyable day for them. During that time the judges were busy marking papers and the practical tests, and late on Thursday evening the task had been completed.

Conclusion

The prizes were distributed on Friday morning by the Land Minister for Commerce. They consisted of beautiful art castings and each competitor was presented with a diploma as well as a little

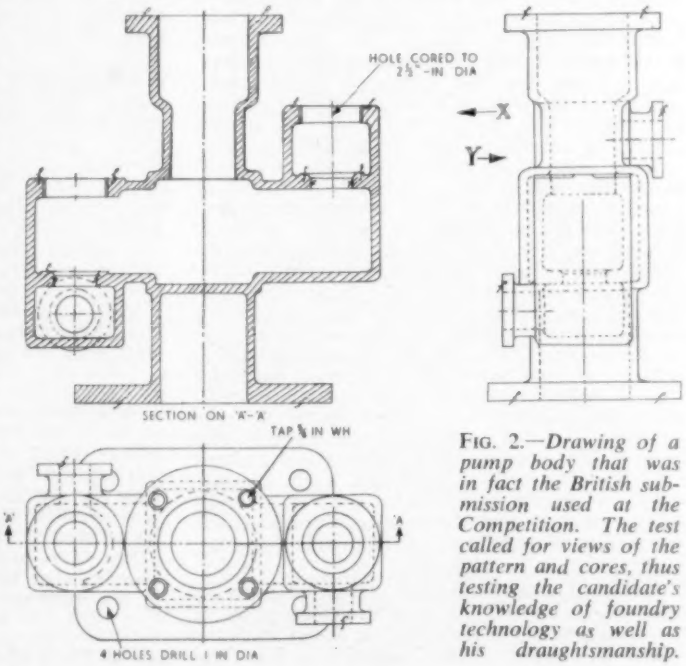


FIG. 2.—*Drawing of a pump body that was in fact the British submission used at the Competition. The test called for views of the pattern and cores, thus testing the candidate's knowledge of foundry technology as well as his draughtsmanship.*

FIG. 3.—*Stages in the moulding and pouring of the gearbox casting set as the practical test. The rather confined "quarters" in which the work had to be carried out may be seen from the centre picture.*

TABLE 1.—*European Competition Results and Markings.*

Placing.	Name and country.	Practical test max. 100.	Theory max. 70.	Total marks max. 170.
1	Kolberg, Ferd. (Germany) ..	*83.41*	*54.0*	137.41
2	Refflinghaus, Jurg. (Germany)	*78.62*	*55.6*	134.22
3	Schwarz, Karl (Germany) ..	*76.21*	*57.8*	134.01
4	Louvet, Bernard (France) ..	*82.03*	*50.0*	132.03
5	Blondeau, Pierre (France) ..	*82.70*	*48.4*	131.10
6	Bay, Pierre-A. (France) ..	*80.48*	*50.3*	130.78
7	White, Edward (Great Britain)	*68.96*	*57.9*	126.86
8	Mitterlehner, Erwin (Austria)	*71.58*	*52.8*	124.38
9	Olesen, Leo (Denmark) ..	*74.23*	*44.4*	118.63
10	Rosendale, Maurice (Great Britain)	*67.18*	*50.7*	117.88
11	Morris, Angus (Great Britain)	*69.65*	*48.1*	117.75
12	Jakobsen, Jens-O. (Denmark)	*74.02*	*38.9*	112.92
13	Groeneveld, Anton (Netherlands)	*73.70*	*30.7*	104.40
14	Paters, Henrikus (Netherlands)	*55.75*	*45.1*	100.85
15	Hubsch, Jean-Pierre (Luxemburg)	*50.76*	*34.6*	85.36
16	de Battista, Renato (Italy) ..	*28.38*	*37.5*	65.88

FIG. 4.— *Competitors at work during the calculation tests. Arrangements were made to overcome the differences between the metric and British systems of units.*

cast-iron enamelled box. The Competition was concluded by lunch given by the German Foundry Association at which several of its prominent members as well as foreign guests spoke.

It was a week of extremely hard work for all those who participated but one could not fail also to respond to the pleasant atmosphere of Munich and the generous Bavarian hospitality. It will remain an agreeable memory to those who took part and a great incentive for the three British boys whose conduct was at all times of the highest order. Full results are given in Table 1.

(This report is made available by Mr. F. C. Hayes, the education and training officer of the Council of Ironfoundry Associations.)

1962 European Apprentice Competition

At the request of the United Kingdom Committee for the European Foundry Apprentices Competition to be held in Italy next May, the Council of the Institute of British Foundrymen has agreed to hold a further National Foundry Apprentices Competition to find the three best foundry apprentices who could represent the UK in the European Competition.

Full particulars of the national competition will be circulated next month and those who have suitable apprentices in their foundries are asked to note that completed entry forms (obtainable from the secretary of the IBF, 14, Pall Mall, London, S.W.1) should be returned by October 31.

The competition will be on lines similar to that of the previous one, namely a written test followed by a practical test. The written test will be held on December 1 and the practical test in mid-January.

A £500,000 CONTRACT for 862 semi-trailers and over 300 tractors with automatic coupling gear has been placed with Scammell Lorries, Limited, of Watford, by British Railways.

Equipment and Supplies

Rotary Cutting-off Saw

Anderston Clyde Engineers, Limited, Field Road, Busby, Glasgow, manufacturers of "Collossus" self-raising gantries, announce an entirely new product, the Neva-Scimitar ultra-rapid cutting-off saw. Claimed by the manufacturers to be suitable for general workshop use, the machine is capable of handling round or square bars or tubes and (presumably) casting runners, heads and flash. It is powered by an 8-h.p. electric motor, designed for high-speed running, and the special-alloy cutting blade (21-in. dia.) is fixed directly on the motor shaft and is easily removed for re-sharpening. Capacities for the new machine are rod, tube and bar up to 4-in. dia., and heavy sections up to 6 by 4 in. The manufacturers claim that the machine can cut, for example, 2 by 2 by 3/16-in. angle-iron in less than two seconds to maintain a rate of 1,500 cuts per hour. In addition to high-speed cutting, other claims for the machine include rapid cutting without scarcely any heat being generated, and smooth, clean, burr-free cuts; overall dimensions are 4 ft. 6 in. by 2 ft. 8 in. by 4 ft. 6 in. high, and its nett weight is 800 lb.

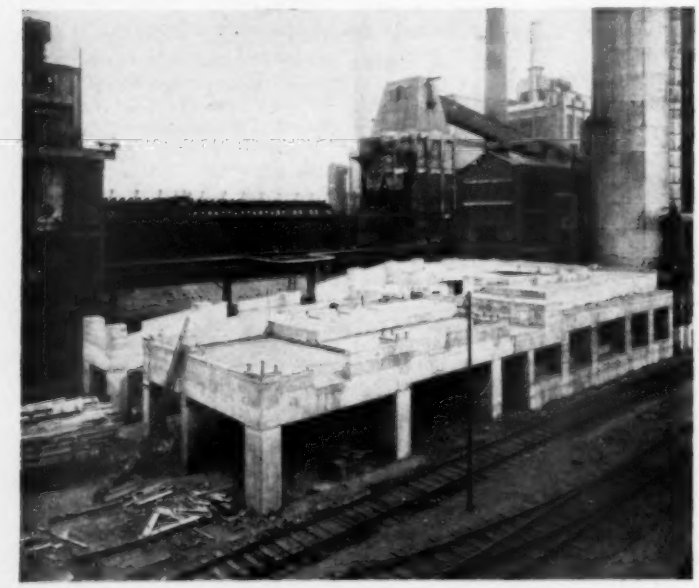
Mains-frequency Furnace

A two-chamber mains-frequency furnace for the simultaneous melting and holding of non-ferrous metals has been designed and marketed by Asea, Västerås, Sweden. Said to be particularly useful in conjunction with die-casting of aluminium and its alloys as well as brass, the new furnace may also be used for melting both ferrous and non-ferrous metals for mould casting. The two chambers of the furnace are accommodated in a sheet-steel casing and are connected to one another by means of two melting ducts. The charging material in the form of ingots or scrap is placed in the charging or melting chamber, and the molten metal is taken out with a ladle from the holding or casting chamber for transfer to the die-casting machine or mould. The temperature in the holding chamber is regulated automatically and provided that the melting chamber is not charged too irregularly, a continuous supply of molten metal should always be available at the desired temperature.

One of the advantages claimed for this furnace—besides eliminating transport of molten metal—is that the bath movement in the melt ensures a good surface, since the greater part of the oxides and impurities will remain in the melting chamber. Any impurities that may penetrate into the holding chamber tend to accumulate on the inside of the bath surface, close to the centre of the furnace. The furnace does not require any special foundation and it can be placed direct on the floor, even when it is fitted with a special tilting arrangement.

Gas Scrubbers: A transportable pilot-plant has been constructed to demonstrate the fume-cleaning results obtainable by the Venturi scrubbing process by Ambuco, Limited, Old Bond Street, London, W.1, a member of the Gold Fields Mining & Industrial Group. The scrubbers are made under licence from Waagner-Biro of Austria and incorporate a process in which the fumes are caused to pass through two complete cones of water, ensuring—it is reported—up to 99.6 per cent. removal efficiency of most entrained solids in the range of 5 to 0.01 microns.

Closed-circuit Television: Wolsey Electronics, Limited, Cray Avenue, St. Mary Cray, Orpington, Kent, have been appointed distributors in the UK of Grundig closed-circuit television equipment and measuring instruments. To illustrate the application of closed-circuit television and instrumentation to industry and commerce, an exhibition is to be staged from September 18 to 22 on the first floor of 39/41, New Oxford Street, London. The exhibition is to be open at 10 a.m. to 6.30 p.m. each day.



Ford Furnace Foundations

Illustrated alongside are the heavy reinforced - concrete foundations for a new blast-furnace and pig-casting house recently completed for the Ford Motor Company, Limited, Dagenham, Essex. The foundations required more than 3,000 tons of concrete which were placed in position by a tower-crane 95-ft. high at a rate of 200 tons per day. Anticipated production date for the new furnace is the summer of 1962. The contractors for this work were Holland & Hannen and Cubitts (Great Britain), Limited, and the consulting engineer, Mr. J. Mason, A.M.I.C.E., M.I.STRUCT.E.

Mercury: Johnson Matthey & Company, Limited, 73-83, Hatton Garden, London, E.C.1, announce they are able to offer in quantity redistilled mercury which has a maximum impurity content of five parts per million (mostly copper and silver), and triple-distilled mercury with a maximum of 1 part per million.

Vienna Congress Papers, II

The JOURNAL'S coverage of the International Foundry Congress held this year in Vienna is continued with further abstracts and comments on the papers delivered during the technical sessions. The 14 papers summarized here cover a wide field of foundry practice and metallurgy.

Continued from page 138

"LD Process" for Steel Castings

(Austrian Paper)

By Dr. R. Rinesch, Dipl. Ing. P. Neudecker and Dipl. Ing. J. Eibl.

(in German)

The United Austrian Iron and Steel Works at Linz/Donau developed in 1949 to 1952, a steel-making process which they stated fully met the requirements for the production of ingots and shaped castings. The principle of the process consisted in blowing oxygen gas with a minimum purity of 98 per cent. on to the surface of a hot-metal bath. The aim of the process was to blow pig-iron grades low in Si as well as grades high in Si with a simultaneous addition of scrap. The authors stated that the process has now developed to such an extent that practically all grades of pig-iron and cupola iron could be blown.

A nitrogen content of 0.007 per cent. and an oxygen content similar to that in open-hearth steel should be obtained in the finished product. Crucibles used were basic-lined (magnesite or dolomite) and oxygen was supplied through a water-cooled nozzle under a pressure of 8 to 12 atm., its consumption varying between 1950 and 2120 cu. ft. of oxygen per ton of steel. Charging material for the production of steel castings was given as cupola pig-iron (for small castings) and pig-iron from the mixer (for large castings). The behaviour of elements associated with the iron was given as follows: During the blowing time, carbon was the main heat-carrier, the burning of the carbon beginning simultaneously with blowing. Silicon burned almost completely down and the amount of scrap required for addition depended upon the silicon content desired. Manganese content was reduced, the final figure depending on slag conditions and temperature. Phosphorus was blown down to 0.025 per cent. in the final product irrespective of the phosphorus content of the metal charged. Sulphur content was reduced in the "reaction zone," of the oxygen and escaped in the form of SO_2. If the sulphur content was high, the pig-iron needed to be first desulphurized. Blowing time amounted to 16 to 22 min., the weight of the charge not being taken into account, and the final temperatures of the hot metal in the "crucibles" varied between 1620 and 1670 deg. C., the yield amounting to 88 to 90 per cent. of the metallic charge.

Large and Small Melts

Next, the authors detailed the course of a melt for the production of small castings in a 5-ton crucible, as well as for the production of large castings in a 30-ton crucible. It was stated that at the present time, 90-ton crucibles were in operation and 250-ton crucibles were in construction. Advantages claimed for steel production in the basic-lined LD crucible were given as:—Low investment-costs, low erection-costs, high flexibility in cases of fluctuation in production, low maintenance costs in the case of shutdown, a high degree of dephosphorization, partial desulphurization, no formation of cracks, no susceptibility to welding cracks, low contents of oxygen, nitrogen, hydrogen, good physical properties of the metal, good "castability" and numerous permutations as far as the raw material to be used was concerned. The Process had also proved to be quite suitable for the production of alloy-steel castings and the large number of castings already produced showed its applicability in many respects.

Thin-walled Moulds*

(Russian Paper)

By B. V. Rabinovich, B. P. Platonov and F. F. Rezinskikh

(In English)

In 1944, the authors reported that a method was proposed in USSR for the making of thin-walled moulds by blowing a sand mixture into the space between the pattern and a shaped flask; the procedure was christened the R-process. Investigation of the structure of iron castings from 10 to 30-mm. thick cast in dual structure moulds of this type pointed to the absence of cementite even with only a 5-mm. layer of sand, but the process was found to have some defects along with advantages. However, as a result of lengthy research and experiments, the process underwent changes and was improved considerably.

Results of the studies were used in developing the new process of moulding the "Volga" engine crankshafts which was described in the paper. At present, the moulding process has been divided into two stages; first, the layer is preliminarily shaped by the sand-blowing method, and second, the final "differentiated" squeezing is effected at a high pressure. Two variants of the R-process were suggested in the paper—for mass-production, a shaped flask is used as a support of the thin layer, and in batch production, the mould is made with stiffening ribs which impart structural stability without the need for flasks. Economic advantages of the process, said the authors, lay in the reduced consumption of moulding materials, low costs of

* It is proposed to print this paper in full in the JOURNAL shortly.

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the binding materials used and in the high productivity in relation to labour employed.

Phosphorus Embrittlement in Steel Castings and its possible elimination

(Austrian Paper)

By Prof. J. Czikel

(In German)

The author stated that on the basis of experiments carried out on electric-furnace and Bessemer steel castings, the embrittling effect of phosphorus could be shown quantitatively. It increased with increasing content of sulphur and carbon and could be defined as the effect of heavy mixed-crystal segregation. When the possibilities of neutralizing this effect were considered, diffusion annealing, primary grain-refinement and the "tying up" of phosphorus came to mind. All these three methods were capable of reducing phosphorus segregation and thus acted favourably in regard to the plastic properties of steel castings. The weakest result was effected by diffusion annealing, because an equalization of concentration occurred within technically-acceptable periods only at higher temperatures, but to a notable extent, a rough grain-formation also occurred. With an increase in cooling rate, as for example in the case of a changeover from sand to die-casting practice, primary as well as secondary grain-refinement took place. Because of this primary grain-refinement, there was a more-uniform distribution of phosphorus and hence a partial neutralization of the embrittling effect of phosphorus. Annealing periods and temperatures could be reduced considerably in the case of steel die-castings. It was also possible to "tie-up" phosphorus in the form of stable and insoluble phosphides by the addition of certain elements such as calcium, cerium or magnesium; in this way the element's tendency to segregation could be partially or completely neutralized. At the same time, an increase in the toughness properties of the metal could be expected. Treatment with cerium, magnesium or "master" alloy, showed very good results. Even though it was true that in order to achieve the values specified, another recrystallization from the α to the γ modification had to be brought about, the plastic properties of the steel were indeed excellent and at least for special purposes, such a metallurgical treatment as put forward in this paper was justified.

Flowability of Moulding Sands

(Spanish Paper)

By Dr. J. M. Navarro and Dr. J. Navarro-Alcacer

(In English)

The flowability of sand/water/clay mixtures was determined as the ability of the mixture not only to flow, but to retain adequate mechanical properties at places into which it had penetrated. For this purpose, the penetration capacity of these mixtures into certain grooves at a given ramming hardness was investigated and an examination was made of the influence of such variables as the amount of moisture; percentages of bentonite; AFS fineness-number, uniformity of grain-size, grain-size distribution of the sand; type of bentonite used; effect of activating the bentonite with sodium carbonate; the shapes facilitating the entry of sand and the effect of increasing amounts of applied energy in the form of ramming blows.

The main conclusions of the paper were as follow: The amount of water in the mixture was the variable having the greatest influence; a given sand mixture had a maximum penetration and retention-of-shape capacity for a certain water content which varied with the percentage of binder; increasing amounts of bentonite improved the penetration capacity of the sand, while the AFS fineness number had hardly any effect at all; for low water-contents, calcium bentonites showed better properties than sodium bentonites, the phenomenon being reversed for mixtures with higher amounts of water, and for activated calcium bentonites, intermediate values between those for purely sodium and calcium bentonites were obtained. Some surprising results were obtained with various shapes tested, and shapes which appeared to help the sand to penetrate better were found to be detrimental to physical properties. With regard to the quantity of energy used in moving the sand, it was shown that after a certain limit, further amounts scarcely affected penetration.

Application of Gas Blowing and Injection Processes

(Swiss Paper)

By Dr. E. K. Modl

(In German)

This paper presented a survey of the many possible applications of gas to metallurgical processes in the foundry industry. In his introduction, the author gave a chronological record of progress. A description was given of the research carried out in this field by the author and his colleagues and examples were quoted of typical gas-blowing and injection processes for the production of high-grade grey iron and s.-g. iron. New ways of producing high-quality foundry products by the use of gas/metallurgical processes were also indicated for practical foundrymen.

The first section of the paper dealt with gas-blowing treatments, especially the effects of blowing nitrogen into molten grey iron. The second section was devoted to foundry injection-processes using reactive solids carried by inert gases—for carburizing, inoculating and modifying the graphite form in cast iron. The author also discussed the formation of graphite in flake form through upgraded or modified shapes to the spheroidal condition. In conclusion, he gave several examples from his company's production (Gebr. Sulzer AG, Switzerland)

of thin-walled castings in grey and s.-g. iron. A short colour-film showing the use of the Lindé "Injectoloy" process for making s.-g. iron in the Sulzer foundry at Bulach was also shown.

Ultrasonic Detection of Defects in Cast Steel

(British Paper)

By Dr. A. H. Sully, M.Sc., and J. D. Lavender, A.I.M.

The paper stated that there were three main factors which had been considered to have a limiting effect on the use that could be made of ultrasonic non-destructive examination in steel foundries. These were: The nature of the cast structure, the relatively rough surface of unmachined castings, and the complicated shape of many castings. The authors then described an investigation of the effect of the first two of these factors on the transmission of the ultrasonic beam and the sensitivity of defect detection in cast steels. In determining the effect of structure, the attenuation of ultrasonic beams of 1.25, 2.5 and 5.0 mc. per sec. frequencies in 0.3 per cent. carbon cast steel were determined for test blocks containing columnar and equiaxial crystals, and for a variety of heat-treatments. The results were compared with similar measurements made on on a forged-steel reference block, using both surface-probe and water-immersion techniques. Measurements were also made over the same range of frequency to correlate the attenuation of the ultrasonic beam with the roughness of the input surface and that of the reflecting surface. The effect of roughness of the input surface on the sensitivity of detection of flat-bottomed drilled holes of 1.5, 3.0 and 6.0-mm. dia. respectively at a constant depth of 115-mm. below the casting surface was also investigated. Some examples were quoted of the application of the ultrasonic technique to the detection of defects in small commercial steel castings and the potentialities of ultrasonic inspection in routine steelfoundry production were discussed.

Comment

Of the Congress technical proceedings for which the writer has knowledge, it was clear that this contribution was one of the best received and the most prolific in comment at question-time. It appeared that there is considerable interest in ultrasonic detection, its scope and limitations, not only in the steel field but in other spheres of foundry practice. Foundrymen in the United Kingdom can congratulate themselves on having taken a lead in the practical development of this new method of non-destructive inspection.

Directionally-controlled Solidification of 100-ton Steel Castings

(Italian Paper)

By P. Tavolotti and G. Iaccarino

(In French)

The authors aimed at giving a theoretical foundation to the problem of the directional solidification of large steel castings by recalling the general equations of heat transmission and under legitimate simplifying assumptions. At the same time, a hypothesis was given covering requirements of a gradient of the solidification time necessary to ensure a casting free from shrinkage cavities. Heat abstractions were calculated, their assessment being checked by the use of water-cooling coils.

This practice was then applied to the casting of six rolling-mill housings weighing 92-tons each, the casting being caried out by using only one feeder weighing 22 tons for each housing. The yield obtained was given as 81 per cent. The castings were checked by ultrasonic means and found to be satisfactory. The experience gained, so far, indicated that there was a distinct possibility of extending the practice to a wide range of very large steel castings, and giving good technical and economical results.

Influence of Some Elements on the Developments of Eutectic Cells

(Jugoslav Paper)

By C. Pelhan

(In German)

The author reported that solidification of the sub-eutectic grey cast iron began with the segregation of austenite, and segregation of eutecticum from the remaining melt in globular form (called eutectic cells) began at the eutectic point. On investigating melts chilled at the eutectic point during solidification, the author said it had been found that it was possible to divide eutectic cells with regard to their form and size of graphite, segregated in the cell, into four groups as follow: (1) Eutectic cells of irregular form with coarse lamellar graphite; (2) eutectic cells of globular form with graphite in the form of rosettes; (3) eutectic cells of regular globular form with very fine, equally-distributed graphite, and (4) eutectic cells of regular globular form with globular graphite.

By making additions of different elements, the author and his colleagues had tried to find what was the cause for the different forms of graphite in cast iron. It was found that various elements, *e.g.*, sulphur, propagated the formation of nuclei by lowering the energy formation of main boundaries. The cast-iron melt was then not under-cooled and the graphite in the cell was very coarse. With the addition of elements which tended to purify the melt, *e.g.*, titanium and aluminium, crystal nuclei were removed from the liquid melt, the metal tended to be under-cooled and the graphite was finer. The addition of Mg to the melt caused the globular form of graphite and of the cell. It was also found that melts, solidifying with a large temperature rise at the eutectic point, had usually coarser forms of graphite than those with a less-marked and less-steep rise of temperature. According to the experiments carried out, it was concluded that at the eutectic point all forms of graphite segregated directly from the liquid melt.

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Comment

If the writer interprets correctly the discussion which followed the presentation of this paper, it appeared that the author was taken to task by one or two speakers for using commercial ferro-silicon for inoculation without knowing or checking whether it contained aluminium and if so, how much. It was considered that if aluminium was indeed present in the ferro-alloy, then the conclusions arrived at in the paper could not have been justified.

Role of Calcium in the production of S.-g. Iron

(Japanese Paper)

By Professor Takaji Kusakawa

(In English)

The effectiveness of calcium for spheroidization of the graphite of cast iron had been determined both in the liquid state and in the freezing-temperature range of cast iron and compared with that of the conventional spheroidizing agents, magnesium and cerium. Magnesium was found to be the most powerful agent for spheroidizing both in the liquid and freezing ranges, but calcium was found to be moderately effective at high temperature (up to 1,500 deg. C.), but made no contribution to spheroidizing in the freezing range. Although cerium had some similarities to calcium in its physical and chemical properties, it possessed spheroidizing powers also in the freezing temperature range. This was probably caused as a result of its solubility in liquid and solid iron. Foundry practices to produce calcium-treated s.-g. iron had been developed on the basis of this investigation and the characteristics of calcium produced s.-g. iron were described.

Comment

The discussion was initiated by a long contribution (almost amounting to a lecture on its own) on the subject of the relative effects of calcium and magnesium when producing s.-g. iron. Following that, a prominent Belgian metallurgist confirmed the author's findings but stated that most of the work had previously been reported on, though the paper could be regarded as useful corroborative evidence secured in another country using different raw-material sources.

Problems of Using Sodium-silicate-bonded Moulding Sands in the USSR Foundry Industry

(Russian Paper)

By A. M. Liass

(In German)

In this paper, the Author presented a theory on the strength of moulding sands and, in particular, of sands bonded with sodium-silicate, the theory being based on physical and chemical investigations of phenomena which take place during the bonding of refractory grains with a binder. In these phenomena, adhesives and cohesives forces play an essential part. Using a wide variety of research techniques and apparatus, the author had studied the hardening process of moulding-sand mixtures combined with sodium-silicate under difficult processing conditions.

Adsorption measurements, porosity determination, electronic microscopy, thermal and chemical techniques, along with other research methods, showed that the material which binds the refractory grains together after gassing sodium-silicate containing mixtures with carbon-dioxide, consists of impermeable particles of polysilica of spherical shape, grouped into clusters with a diameter of 70 to 85 Å. After heating (or other dehydration methods) of the sodium-silicate/sand mixtures, this binder becomes non-crystalline and essentially a glassy sodium-silicate, the author stated.

In the paper, experimental data were given which confirmed the generally-accepted theories on the influence of the following factors upon properties of sands bonded by means of the process: Sodium-silicate ratio, introduction of sodium hydroxide, mixing and gassing time and combined application of different methods (gassing with carbon-dioxide followed by dehydration). The paper concluded with a description of the experience of the USSR foundry industry on the application of moulding sands combined with sodium-silicate, for the production of castings up to 80 tons in weight. The probable future for shell moulds and cores produced from sodium-silicate/sand mixtures was also discussed, with particular reference to the production of heavy steel castings.

Comment

The fact that the Rittersaal of the Hofburg was packed to capacity (about 150 delegates) to hear this paper revealed either an overwhelming interest in the subject of CO_2/silicate practices or extreme curiosity as to the amount of progress in this direction in Russia. Unfortunately, several present thought that insufficient data were included with the paper to back up the author's contentions and to some extent questions put in discussion were misunderstood or their main points evaded. Several comments were made on the need for a better understanding of the structure of the silicic-acid film, as affected by temperature and chemical change as the process was worked, but it seemed that new data were lacking.

It was interesting, however, to learn from the Author (who was present in person) that so far about 1,500,000 tons of castings are estimated to have been produced in Russia by the CO_2 Process over the last ten years and the forecast in the next five years in that country is a five-fold increase. Major emphasis on improvements brought about by the process all seemed to be related to the ability to secure greater dimensional accuracy in castings.

A question on the use of bentonite in CO_2/silicate mixtures brought the reply that primarily, bentonite improved the green-strength of the sand mix and secondarily, its presence had an effect on the chemical changes. It was stated that the introduction of Al_2O_3 as a third element in the SiO_2/NaOH phase-diagram had the effect of displacing the "peak" on the hot-strength curve for a given sand by about 200 deg. to about 1,000 deg. C. The author was asked what was meant by his description of "combined gassing and drying of CO_2 cores" as it would seem that the re-introduction of drying was a retrograde step, nullifying main advantages of the process. Mr. Liass, however—who claimed to have been associated with the CO_2 Process since 1949—confirmed that his experiments did not foreshadow any basic alteration in the process as practised in Russian foundries and those of other countries, some of his experiments being of an academic character.

Quality Determination for Iron Castings

(Polish Paper)

By Dr. A. Karamara

(In German)

The author said that it was not adequate for the quality control of castings merely to determine tensile strength, hardness and bending strength of the metal even if the chemical composition and structure were known. Quality of castings was influenced by so many factors and could only be determined by examination of a number of properties of the casting in question. Quality testing in such degree would be expensive and could hardly be used as a testing method for castings themselves because it was a destructive one.

That was the reason for the author's proposition of new means of assessment of casting quality using the slope of the $E_e = f(\sigma)$ graph, where σ = tensile stress, E_e = modulus of elasticity. Alternatively, the slope of the "unloading" line (the line connecting a given point on the stress/strain curve with another point corresponding to the initial stress and showing the elongation remaining after stressing the test-piece to the given point and unloading it to the initial stress), and the stress producing a certain permanent set after unloading the test-piece could be used—for example a permanent elongation of 0.05 or 0.1 per cent.

The author stated further that the reliability of test characteristics of this type had been examined thoroughly by magnetic methods. It was found that test-pieces having similar magnetic properties had also similar mechanical properties. The values of the characteristics mentioned showed in many cases a smaller dispersion than tensile-stress values.

The author continued by stating that the new assessment could be applied successfully to the non-destructive testing of castings. It was shown that the determination of Poisson's ratio and especially of the way it depended upon tensile stress $\mu = f(\sigma)$ might be very important for the quality control of cast iron, but further investigations must be carried out to confirm this point. It was notable that the $\mu = f(\sigma)$—curves could be very different, especially for small tensile stresses, even though test-pieces were cast from the same melt.

Cast Steel with Special Magnetic Properties

(Swiss Paper)

By Dipl. Ing. H. Luling and Dr. K. Gut

(In German)

The authors stated that for structural applications which placed special demands on magnetic-induction properties, it was possible, without any particular difficulty, to replace the usual forgings by steel castings. Experimental work on thick-section test-pieces had shown that the castings gave consistently good values for their properties throughout heavy sections. Castings for which maximum saturation induction was desired were cast in the purest possible iron, and, in particular, the carbon content had to be kept low. When scrap to be used for melts of metal for these types of casting was properly selected, the presence of minor elements in the scrap had a negligible effect.

If, in addition to maximum magnetic induction, high yield-point values were also needed, there were several possibilities among both carbon steels and low-alloy steels. If one attained a higher yield-point as a result of the presence of martensite in the steel structure, bainite or pearlite, then the increase in yield point caused a loss in magnetic properties. Of the usual alloying elements, C, Mn, Cr and Mo, priority was given to their effect on the carbon to ensure the most-favourable relationship between gain in yield-point and loss of induction. It was found that the most favourable properties, *i.e.*, high magnetic induction with high yield-point, were given by molybdenum, boron and nickel steels. Since nickel steel was already well known and could be handled easily in melting and casting, there was no technical objection to its use. Highest yield-points with good induction values were given by precipitation hardening steels, a steel with 0.8 per cent. Mo and 0.3 per cent. V had proved itself particularly good in this respect.

Comment

This is a paper which well deserves attention by the staffs of United Kingdom foundries producing steel castings for electrical purposes. Impressive amongst the authors' illustrations were assemblies of six castings for large composite magnet units weighing from 15 to 18 tons. These and other examples, including one for a generator of 80,000 kva capacity running at 500 r.p.m., had been produced at the works of Georg Fischer, Limited, Switzerland. It was claimed that molybdenum/boron steels with a structure of acicular ferrite would give results as good as those of nickel-steel compositions.

When there was no immediate response to the chairman's opening of the meeting for discussion after this paper had been presented, the chairman

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passed on to the next contribution somewhat abruptly. (In fact, there were during the Congress sessions a number of occasions when the writer feels sure that had more time been allowed or someone had jumped up to "break the ice"—then worthwhile discussion contributions would have been made. It is perhaps too much of an elaboration always to have persons in the audience primed in advance to open discussions, but experience shows that such a procedure does set the "ball rolling," and afterwards useful technical contributions may come thick and fast).

Desulphurization of Carbon Steel to Extra-low Limits in a Basic Electric Furnace

(American Paper)

By A. J. Kiesler

(In English)

The author said that the new process described in the paper was developed to take advantage of the chemical characteristics of molten sulphides. The activities of iron and calcium sulphide varied with melt composition and when the carbon in the bath was high and the iron oxide in it was low and the melt was accompanied by a high lime slag, conditions for sulphur removal were at their optimum. The primary difference in the author's process as compared with the standard two-slag process was the removal of sulphur before the oxidation period. Steel with sulphurs in the range of 0.003 per cent. were easily produced by the process described without any substantial increase in cost. In a 0.20 per cent. carbon steel, a marked lowering of the impact transition temperature had been achieved through the reduction of the level of sulphur.

The steelmaking industry had constantly sought methods by which the sulphur content of iron and steel could be reduced to the region of 0.005 per cent. rapidly and economically and the author next dealt with his new process in detail and described also investigations carried out in the General Electric Company's metallurgy and ceramics research department. Here, all melting, he said, was carried out in a one-ton capacity, 625 kva, three-phase electric-arc furnace, the castings being poured being standard twin keel-blocks cast in air-dried silica-sand moulds.

Comment

The first contribution to the discussion came from a member of UK steel research association who said that work in this country had been conducted on similar lines for two or three years and was known as the reverse-slag process. In production foundries, on melts of from two to five tons, the process had produced metal with as low as 0.01 per cent. sulphur and very low hydrogen content. The author's findings as to the value of the magnesite hearth were confirmed. More-recent developments had been to speed up bath reactions with powder injection and a move had been made towards the adoption of what was in reality a three-slag process. The speaker quoted a figure of 140 lb. in five minutes as a rate of injection which had been practised. He further said the three-slag process got over the necessity for a dolomite hearth and was particularly being developed for alloy-steel melting.

Specific Points

He next addressed specific questions to the lecturer on the degree of accuracy of the sulphur determination at such low contents as were reported, asking whether experiments had been carried out in larger units and how the magnesite hearth could be fettled. The author, replying, agreed that powder injection would be valuable, but he had not tried it himself. Two firms in the United States, he said, had used the process he had described for bulk production of stainless-steel, the first had used it for seven- and three-ton melts and the second for melts of up to 17 tons. Magnesite hearths were quite common in the US, some firms fettled them with dolomite, but his company did so with magnesite.

A Belgian contributor thanked both the author and the previous speaker and said their results were confirmed by researches amongst his compatriots on steel melts of three to five tons, where sulphurs of as low as 0.01 and even 0.006 per cent. had been secured. In answer to his question as to what carrier gas was used in the UK (he himself using dried CO_2) he was told that the first speaker now used nitrogen, after having first employed argon for this purpose. With nitrogen, the pick-up by the metal was inconsiderable and in any case, nitrogen was removed during subsequent oxidation.

Another speaker said he well appreciated that desulphurization was relatively simple with high-carbon melts but surprised to find so much desulphurization of low-carbon steels was possible. To this the Author replied that the results were definitely as stated; he confirmed that with high-carbon material desulphurization was relatively simple, for nodular-iron production for example, it was only necessary to add lime even on the surface of a melt for quite rapid results.

Solidification of Eutectics

(Israeli Paper)

By Dr. Minkiff

(In English)

In this paper, a review was presented of ideas currently existing for eutectic solidification, together with some experimental results which, the author contended, further contributed to the knowledge of the mechanism of eutectic refinement in aluminium/silicon alloys. Experiments had been performed in which dissolution techniques had been

used to extract silicon, and deep-etching techniques to locate the silicon phase in the eutectic structure. It was shown that refinement of the eutectic structure by rapid freezing was accompanied by a change of the growth form of silicon from plates to fern-like dendrites which were joined in a continuous network. The author discussed the branching and dendritic growth as two principal phenomena occurring during eutectic solidification. It was considered that these phenomena occurred generally in cases of eutectic growth and for the well-discussed case of refinement in anomalous eutectics could offer a quite adequate explanation of the refinement mechanism without invoking theories based on nucleation and growth of a dispersed phase. These concepts, the author pointed out, did not allow of any rationalization to be made of graphite-spheroid formation in cast iron; it appeared that this could not fall within the category of eutectic growth.

(Abstracts from other papers to follow)

Japanese Foundry Technology

The 1960 Report of the Castings Research Laboratory, Waseda University, Tokyo, Japan, contains five articles dealing with research carried out at the University during the year. What follow are synopses of the researches and conclusions reached by the authors.

The first article by Nobutaro Kayama and Hiroshi Okita describes tests carried out using acoustic measurement to study metal flow. They state that when molten metal is poured into a mould, some sound can be heard and this varies with the metal flow conditions. If some transparent fluid, instead of ordinary metals, is poured into a transparent mould and if at the same time the pouring sound is measured, this sound will be easily analysed by the fluid flow. Using this method, the authors studied the relations between the sound and flow conditions during pouring and reached the following conclusions: (1) The pouring sound comes from the collision of fluid with the mould wall and its turbulence or agitation; (2) the pouring sound is also related to the involved air or gases in the fluid; (3) when the acoustic level is low, pouring is quiet; (4) the smaller gate compared with the sprue gives the quieter pouring and less gases are included; (5) the use of a system and the mould cavity, giving good results in the strainer eliminates much of the agitation in the gating acoustic level, and (6) from X-ray photography of the solidified metal, it was found that the amount of included gases was related to the acoustic level.

The second article in the Report is by Nobuhisa Tsutsumi and is entitled "Strength of Malleable Iron at Low Temperatures." In order to investigate various mechanical properties of malleable iron at low temperatures, the author performed the tensile test, bending test, hardness and impact test at temperatures ranging from 0 to −196 deg. C. by using a cooling bath specially designed and made in the author's laboratory. From the results obtained, he concludes that when machines and vehicles having components consisting of blackheart malleable iron are to operate in extremely low temperatures, it is necessary only to notice and check their impact strength.

Non-ferrous Reports

"Oxidation of Molten 85/5/5/5 Leaded Red Brass" by Shigeo Oya and Umewo Honma is the third article in the Report. In this article, the authors study with the aid of the fracture test of the chill-blocks oxidation of molten 85/5/5/5 leaded red brass which is a correlative problem with the dissolution of reducing gases. The role of oxide particles during solidification has also been determined microscopically, electron-microscopically and diffractively. The authors state that the process of oxidation of the melt consists of three stages: (1) Oxidation of the reducing gases in the metal (the cast block has the extended columnar and blue-grey patterns on the fracture); (2) elective oxidation of an alloying constituent such as zinc (the shortened columnar and blue-grey patterns are found on the fracture of the chill-block), and (3) formation of Cu_2O simultaneously with oxidation of zinc (the cast block exhibited markedly reduced size of equiaxial grains). Nucleating cuprous oxide was also identified.

The fourth article in the Report deals with the effects of small contaminations of aluminium and silicon in 85/5/5/5 red brass and the research described was also undertaken by Mr. Oya and Mr. Honma. Because they felt that harmful effects of contaminations of aluminium and silicon in 85/5/5/5 red brass were known only on an experimental basis, the authors' paper considered the roles of aluminium and silicon in the metal on a theoretical basis with the aid of mechanical tests, macro- and micrography, radiography and thermal analysis. As a result of research, they found that aluminium and silicon in the metal have different effects on the nature, particularly on the mode of solidification. Aluminium from 0.005 to 0.1 per cent. suspends in the molten metal in the form of alumina which disturbs mass-feeding into clearances of particular networks. This phenomena causes formation of layer porosity which results in lower tensile properties and less pressure-tightness. If 0.3 to 1.0 per cent. aluminium is added in the metal, however, the mode of solidification simulates rather to "skin-formation" type which ensures successful feeding during solidification and overcomes the phenomenon mentioned. Silicon in the range of 0.005 to 1.0 per cent. (partially in the molten metal in the form of silica or silicate and partially dissolves in the liquid) extends the freezing temperature range, which causes more characteristic pasty solidification, resulting in poor mass-feeding. The effect of silicon is rather more deleterious than of aluminium, the paper concludes.

Gas Chromatography

The final paper in the Report is by Jiro Kashima and Takuo Yamazaki and deals with gas chromatographic determination of hydrogen in cast iron. The authors present the procedure of the measurement of hydrogen contained in cast iron and the hydrogen extracted by inert carrier gas method is determined by gas chromatography. The variation of the amount of hydrogen contained in the carrier gas stream is determined. The form of apparatus used and the method of operation are described in detail and the paper states that where samples were heated at 750 deg. C., the reproducibility of this extraction method gave satisfactory results. The analytical method described using hot-extraction by carrier gas and gas chromatography is considered to be available to such materials as iron and steel, copper, aluminium and its alloys.

Personal

Mr. L. S. KINNEAR has resigned from the board of the British Oxygen Company, Limited.

Mr. I. W. MUNRO has been appointed managing director of Hall Engineering, Limited, a subsidiary of Hall Engineering (Holdings), Limited.

Mr. OLIVER MORTON, works service manager of the Wharton Crane & Hoist Company, Limited, Reddish, has retired after 52 years with the company.

Mr. NORMAN J. TRAVIS and Mr. JAMES D. TENNANT, directors of Borax (Holdings), Limited, have been appointed to the board of its subsidiary, Hardman & Holden, Limited.

Mr. DEREK ALFRED LARKINS, A.C.W.A., has been appointed chief accountant of Lansing Bagnall, Limited, fork-lift truck and industrial tractor manufacturers, Basingstoke, Hampshire.

Mr. E. J. AARONSON has been appointed general manager, overseas operations, of the General Electric Company, Limited. He was previously economic and financial adviser (export).

Mr. RONALD R. JOHNSON, of Australia, has been appointed Trade Commissioner at Australia House, London. He succeeds Mr. NEVIN ELLIS, who is returning to Australia next month.

Mr. WILLIAM SIDWICK, aged 77, has been presented with a cheque to mark his 50 years' service as an assistant accountant with the General Electric Company, Limited, in Birmingham.

Mr. ERNEST G. GROSS, a director of the Distillers Company, Limited, since 1954, has left the UK to take up his appointment as resident director of the Distillers Company in Australia.

Sir DUNCAN ANDERSON, Mr. S. SCOTT, chief production engineer, and Mr. S. H. WALKER, chief design engineer, have been appointed to the board of the South Durham Steel & Iron Company, Limited.

Mr. H. R. CLARK, M.B.E., T.D., general manager of Jenson Motors, Limited, West Bromwich, has been appointed a director of the company. He remains responsible for the general management of the company.

Mr. PETER BONNER, B.SC., has been appointed to the board of T. C. Jones & Company, Limited, structural engineers of London and Treorchy, South Wales, an associate company of the George Cohen 600 Group, Limited.

Mr. P. HOYLE has been apponted to the board of Rownson Conveyors, Limited, a member of the Baker Perkins group. He continues as deputy manager of the bakery and machinery department of the parent company.

Mr. F. W. CLIBBERY has been appointed managing director of Amal, Limited, a subsidiary of Imperial Chemical Industries, Limited. Mr. R. G. HUTCHINGS and Mr. D. S. IZON have been appointed directors of the subsidiary.

Mr. R. F. LANG, managing director of the wholly owned subsidiary, F. Francis & Sons, Limited, has been elected a director of F. Francis & Sons (Holdings), Limited, ironfounders and engineers, Thames Ironworks, London, S.E.13.

Mr. DARBY HADDON has retired from the position of chairman and managing director of W. H. Dorman & Company, Limited, but remains a director. The Hon. H. G. NELSON, managing director of the English Electric Company, Limited, has been appointed chairman.

Mr. DONALD B. HIRSCH is to join the overseas division of Monsanto Chemicals, Limited, as manager of economic planning for Europe on September 1. He will be located in St. Louis until January, 1962, after which he will make his headquarters in Geneva, Switzerland.

Sixty-five-year-old Mrs. A. STEVENSON, who joined Smith & Wellstood, Limited, ironfounders, Bonnybridge, as a shorthand typist from school, has retired after completing 44 years' service with the firm. Mr. J. C. Leith, a director, presented her with a monetary gift from the staff, and she will receive a certificate from the company in recognition of her service.

Mr. S. S. SMITH, research manager of the Metals Division of Imperial Chemical Industries, Limited, Witton, Birmingham, has been appointed executive director and general manager of the newly-formed Nuclear Developments, Limited. The private company has been formed by ICI, Limited (metals division), Rolls-Royce, Limited, and the Rio Tinto Company, Limited.

Mr. H. DESMOND CARTER, chairman and managing director of Crossley Brothers, Limited, has been appointed chairman of the British Internal Combustion Engine Manufacturers Association in succession to Mr. L. P. LEE, for the coming year. Mr. C. F. BARNARD, executive vice-chairman of Mirrlees Bickerton & Day, Limited, has been appointed vice-chairman of the Association.

Mr. JOHN T. RILEY, a director of David Brown Industries, Limited, Huddersfield, has resigned his position as director of manufacturing at the company's factories at Lockwood, Coventry and London, to join the board of the Moss Gear Company, Limited, Birmingham. He has been with David Brown's for 41 years, starting as an apprentice. During the war he was in charge of the group's factories in London, and remained there until 1949 when he returned to Huddersfield to take charge of the light engineering division at Park Works. In 1956 he was appointed general manager of the automobile gear and gear-box divisions.

Wills

LLOYD, C. A., for 33 years a director of Stewarts and Lloyds, Limited, steelmakers, etc., of Glasgow £104,932

LLOYD, J. C., a director of Stewarts and Lloyds, Limited, and a descendant of the founder of Lloyds, Limited £116,007

KENWORTHY, HERBERT, for over 40 years chief buyer with the Lilleshall Company, Limited, engineers and implement manufacturers, of Oakengates (Salop) £7,542

SJOGREN, JUSTUS, chairman of Sandvik Swedish Steels, Limited, and Sandvik Steel Band Conveyors, Limited, and pioneer of the Swedish Sandvik organization in Britain £110,225

JAMES, HON. ROBERT, chairman of Barnsley District Coking Company, Limited, and Barrow Barnsley (Holdings), Limited, and formerly of Barrow Haematite Steel Company, Limited £16,560

SMOUT, SIR ARTHUR, eminent metallurgist and industrialist, chairman of Murex, Limited, and former chairman of what is now the metals division of Imperial Chemical Industries, Limited £62,281

DUNCALFE, SIR ROGER, chairman of British Glues & Chemicals, Limited, vice-president of the Federation of British Industries, past-president of the British Standards Institution, and deputy chairman of the Beaver Committee on Air Pollution £130,484

Notes from the Branches

South Africa

Another record was made when over 200 members and guests attended the annual dinner of the South African branch of the Institute of British Foundrymen held in Johannesburg on June 16.

Awards

During the course of the evening, the retiring president, Mr. D. Gordon Jones, presented diplomas for the best papers read during the year 1960. The non-member's diploma was awarded to Dr. W. Bleloch for his Conference paper entitled "Recent Developments in Electric Steel Melting Practice," and Mr. S. H. J. Wade received the member's diploma for his lecture and demonstration on "The Making of A Ship's Propellor."

Mr. S. Jane presented the Alexander medal and prize, the medal being awarded to Mr. G. C. S. Webster for his paper entitled "Some Thoughts on Sand Control," and the prize to Mr J. R. Walton for his paper on the subject of "Planning and Standardization in the Foundry." Mr. Wade travelled 1,000 miles from Cape Town to receive his award, and Mr. Walton, hon. secretary of the Natal section, 400 miles from Durban to receive the Alexander prize.

Toast to Branch

Mr. Gordon Jones called on Mr. R. P. Hacking, president of the South African Institute of Mechanical Engineers, to propose the toast to the branch. Mr. Hacking thanked the president and Council for their kind invitation to him to address the gatherine, and introduced his toast by reference to the new *Journal* of the South African branch.

Future of Castings

After speaking about his own brief experience in the foundry industry, Mr. Hacking asked if it were perhaps correct to suggest that, in general, improvements in foundry techniques have not always kept pace with other methods of shaping and forming metal. If this is so, he said, would it also be true to state that the casting of products once played a relatively more prominent part in manufacturing than it does today? He then urged members to use their skill and ingenuity to develop techniques for the production of castings which would continue to meet the demands of the engineering world. Mr. Hacking concluded his speech by proposing a toast to the South African branch.

Mr. Gordon Jones, in reply, thanked Mr. Hacking for his remarks and said that they were appreciated all the more because they came from the president of one of the country's oldest and most important technical Institutions, the S.A. Institute of Mechanical Engineers.

Valedictory Address

In his valedictory address Mr. Jones said the year had again been a very successful one for the branch. The papers presented maintained a high standard and this was borne out by the fact that attendance at general meetings was very satisfactory indeed, and, at one of the meetings, records were broken with an attendance of over 200. The works visits had been interesting and informative, and two of them—those to Vecor and Cullinan Refractories, where the visit was combined with sporting events—would remain long in the memory of those who were fortunate enough to be present. The social side had not been neglected and well-chosen programmes had enjoyed large attendances. The annual dance was now an established institution and worthy of the support of all members and friends.

Conference

In referring to the annual conference of the branch, Mr. Jones said that the Council laid great stress on the practical aspect of papers. The three papers which had been presented this year were in this category and had given rise to excellent discussion. He recommended the conference to all foundry excutives as it would yield good dividends in the dissemination of foundry techniques and the sharing in the good fellowship shown on these occasions.

Journal

The retiring president went on to say that the branch had always had a cordial relationship with the S.A. Institution of Welding and the Institution of Production Engineers (S.A. Council). This year, the branch Council had linked with them to produce the *F.W.P. Journal*. This venture called for a great deal of courage as well as active and friendly co-operation between the three Institutions.

He congratulated the branch secretary, who was also managing editor of the *Journal*.

SA Award Winners

At the annual dinner of the South African branch a number of awards were presented to members. Seated, left to right—S. H. J. Wade (member's diploma); J. R. Walton (Alexander Prize); G. C. S. Webster (Alexander Medal); Dr. W. Bleloch (non-member's diploma). Standing, left to right—D. Gordon Jones, retiring president, who presented the members' awards and Mr. S. Jane who presented the Alexander awards.

Notes from the Branches

Confidence in Country

There may be a feeling, Mr. Jones continued, that owing to world events and other incidents outside the country's control, it was not sharing in the general upsurge of business worldwise, but he had complete confidence in the resiliency of South Africa, with its tremendous resources of mineral wealth and particularly those things which the outside world needed. There was very little in the way of capital equipment and general maintenance that South Africans could not undertake themselves.

In conclusion, he said that with a secretary and treasurer of the calibre of Mr. John Steele and Mr. Stanley Jane, the office of president was a sinecure, and he hoped their services would be available to a long succession of presidents. He also thanked the Council for their very loyal support, and Mr. Ian Duncan for his work as secretary of the papers and membership committee.

Induction

The final duty performed by Mr. Gordon Jones was to welcome the new president, Mr. J. Peers. Mr. Jones said that Mr. Peers required no introduction to the members as he had been a very active member of the Council and in the affairs of the branch. He complimented Mr. Peers on his election to the office of president, and assured him of his continued support in the Council. Mr. Peers thanked Mr. Jones for his words of welcome and complimented him on an extremely successful year of office. He then presented the retiring president with his past-president's certificate and shield.

Presidential Address

The new president thanked the members for electing him to the office of president and said he would do all he could to maintain the high standard set by his predecessors.

Memorial Lecture

He announced that in future, the principal lecture at the annual conference would be known as the "Harry Holdsworth Memorial Lecture," and that it would be the privilege of the president to prepare and deliver this address. The Council felt that the establishment of this memorial lecture was the most appropriate way to pay respect to the memory of the late Mr. H. Holdsworth for the work he did, not only in branch affairs, but also for the foundry industry in South Africa.

Membership

The president said the branch could feel proud of the fact that, combined with the Natal section, it had 53 subscribing firms, which was more than any other branch, some of which enjoyed a roll of over 1,000 members. He urged a drive for members, if the branch wished to continue as a force in the development of South African industry.

He said that no other means of recruitment compared with the personal recommendations of those who were already members, and appealed to all members to assist particularly to enroll young foundrymen who showed interest in technical and managerial matters. The building up of the younger element, he said, would not only secure the future of the branch, but would also help to provide management material for the foundries of the future.

Sands Research

Mr. Peers reminded his audience that the branch had successfully established a foundry sands research fellowship in 1958. On the occasion of the first meeting of the sponsors, Dr. Grant, then acting director of the Council of Scientific and Industrial Research, had pointed out that it was the first fellowship of its kind in South Africa and congratulated the sponsor firms on their progressive attitude. The project, Mr. Peers said, had really been launched when the CSIR secured the services of Dr. P. H. Riley as the research fellow in February, 1959, for a period of three years. Today, all sponsor firms had received a data book entitled "South African Moulding Sands," published by the CSIR, in November, 1960, to mark the completion of the first phase of this sands research project.

Mr. Peers then paid tribute to the work done in the past by private firms on this subject, but said there could be no doubt that the data book was by far the most comprehensive work on the subject to date, and compared more than favourably with similar international publications on foundry sands.

The second phase of the fellowship, which consisted of the testing of bonding materials, was now under way, and, on completion of this phase, a similar data book would be published. The second phase would probably continue to the end of the three-year period, and Mr. Peers announced that the branch Council had appointed a committee to investigate and make recommendations for the continuation of the fellowship.

Mr. Peers concluded his presidential address by proposing a toast to the guests of the branch and he thanked them for the compliment they paid by being present at the dinner.

Conclusion

The response to the toast to the guests was made by Mr. L. G. Axe, president of the S.A. Institute of Electrical Engineers. In a brief and witty speech, Mr. Axe complimented the branch on the work it was doing in the country, and assured the members of his continued interest in the work of the foundry industry. The evening was concluded by an address given by Mr. Jack Tonge, past-president, in his own inimitable and humorous manner.

Officers 1961/62

At the annual general meeting of the branch, held during May, the following officers were elected:—As president, Mr. J. H. Peers; senior vice-president, Mr. A. B. Anderson, and junior vice-president, Mr. G. C. S. Webster. Mr. C. W. Fenton, Mr. H. H. Jones, and Mr. F. G. W. Sutton were elected to the Council. Mr. I. R. Duncan, who retired by rote, was re-elected; Mr. S. Jane and Mr. J. Steele were re-elected as hon. treasurer and hon. secretary respectively.

Falkirk Section

At the annual general meeting of the Falkirk section it was decided to donate £3 prize money to the Burnbank Foundry Trades Centre, Falkirk. The principal of the Centre, Mr. N. Curry, B.SC., awarded the prize to Mr. J. Crosbie, of the Falkirk Iron Company, who was judged to be the best fifth-year pattern-maker, based on day and evening class marks. Another prize has also been given by Mr. Curry to Mr. W. Bennie of the third-year moulding section.

Australia (Victoria)

A paper entitled "A Review of Electric-melting Units, with special reference to Foundry Practice in Sweden" will be presented by Mr. H. Petter-Flaathe to a meeting of the Australia (Victoria) branch on October 18 at the Metallurgy Theatre, Royal Melbourne Institute of Technology.

Russian Cosmonaut's Foundry Associations

Last month, the Russian Cosmonaut, Major Yuri Gagarin was much fêted during his visit to this country and foundrymen all over the world were gratified to learn of his early association with the foundry industry in Russia. As part of the extensive celebrations which attended his sojourn in the UK, he was presented in Manchester with honorary membership of the Amalgamated Union of Foundry Workers and with a gold medal to mark the occasion; he also toured the Metro-Vick foundries in Trafford Park, part of AEI (Manchester), Limited, where a total of 65,000 are employed. It is now possible to record details of this visit and some of the previous foundry associations of the Russian hero.

Early Career

After finishing the sixth form of a secondary school in Gzhatsk, Yuri made up his mind to go to Moscow. His first few days in Moscow were spent in sightseeing and he was taken over the agricultural-machinery works at Lyubertsy. Trainees were being enrolled at the local trade-school at that time and the headmaster there told Yuri that he could be placed in a foundry class. Seeing the Pushkin monument in Moscow and being told that it had been cast by foundrymen, had convinced him that he would do well to become a foundryman.

During the first few days at the training-school, Yuri was taken on a tour of the foundry in which he was later to work, and soon afterwards, was assigned to a machine making flaskless moulds. The young apprentices made the moulds, inserted reinforcing rods, closed on the tops and placed them on the conveyor. On one occasion after being reprimanded for the amount of scrap they'd made due to misplaced rods, the foreman showed the apprentices one at a time how the job should be done and better progress was then made. Yuri also had lessons in theory along with practical work, but preferred the latter. He stayed for one year at this school and then joined

Scenes during the visit of the Russian cosmonaut, Major Gagarin, to the Trafford Park Works of AEI (Manchester), Limited. (a) His question-and-answer session at the side of a dry-sand mould for an 8-ton centre-cylinder casting for a turbine. In (b), Major Gagarin is shown signing the "distinguished visitors" book. (c) Mr. E. H. Beech, foundries superintendent, elucidates a point with Yuri at the mould side. (d) Party moving to the foundry after the reception at the entrance to the works; on the Major's right hand is Mr. Boris Belitsky, his interpreter, and on his left, Mr. R. H. S. Turner (director of manufacture AEI Manchester), at their rear is the Russian Ambassador, Mr. A. Soldatov.

Russian Cosmonaut

the Saratov Industrial School, also as a moulder-trainee. Whilst so attached, he worked at the Voikov plant in Moscow and the Vulcan Works in Leningrad. At the end of what appears to have been a four-year course, he graduated with an honours certificate as a qualified foundry technician. However, while still at Saratov, Yuri had joined the flying club and there developed his interest in flying. Thus after graduating instead of pursuing foundrywork he transferred his interests and entered the Soviet Air Force.

Foundry Visit

The visit to the Trafford Park foundries was sponsored by the Amalgamated Union of Foundry Workers, who had obtained permission from the works management, and was made at less than 24 hours' notice. Throughout his 25-min. tour of the works, Major Gagarin received a boisterous welcome from the employees, but showed himself unperturbed and indeed appeared happy merely to be in a foundry again. He arrived with an escort of police (accompanied also by Mr. A. Soldatov, the Russian Ambassador) at the works north gate reception office and was greeted there by Mr. A. C. Main, Mr. R. H. S. Turner, Mr. G. H. Jolley (all three being directors of A.E.I.) and Mr. A. Paterson. The works committee were also there in strength, along with their chairman, Mr. H. Brennan.

After signing the "distinguished visitors" book, he walked over to the foundry, all the time cheered by employees and almost mobbed later during his tour from mould to mould in the company of Mr. E. H. Beech, foundries' superintendent. It was clear that he was well at home in the foundry and fully appreciative of the nature of the work being carried out on both large and small moulds. During a short question-and-answer session with Mr. Beech (through his interpreter), the Russian visitor asked questions about output per man, how long various jobs took and commented on the high quality of the moulds and castings being produced.

Following the foundry session, the party passed to the works yard where the distinguished guest was introduced to a very large assembly of workpeople by Mr. Fred Hollingsworth (AUFW chairman), who, as his sponsor in Manchester, had accompanied the tour throughout.

Industrial Training Council Report

Although the Industrial Training Council's Second Report, January 1960 to March 1961, deals with employers' association/union co-operation in training in 36 industries, no mention is made of the outstanding work done by the Council of Ironfoundry Associations in the field of juvenile training. Yet in comparison with the iron and steel industry, the CFA schemes are more costly and highly developed than in most other industries. The booklet, however, does carry much information useful to at least the ferrous side of the founding industry. The report is published by the Council from 36, Smith Square, London, S.W.1; price 1s. 3d., plus postage. (The reviewer wonders what would happen if somebody sent only the 1s. 3d. demanded for this publication. Would it need a shillingsworth of correspondence to put the matter of postage right? At least it should be possible for publishers to indicate postage fees within the country of origin.)

Steel Output in July

Production of steel in July, affected as is usual by the holidays, was at an average rate of 380,200 tons a week, compared with 447,500 tons a week in June, states the Iron and Steel Board in its monthly production statement published last week. The July rate represents a 3 per cent. drop on the comparable figure for last year. Production of pig-iron was at an average of 276,600 tons a week, compared with 297,400 tons a week in June, and 288,900 tons in July, 1960.

The stocks of steel held by users and merchants, the board reports, fell by about 80,000 tons or nearly 2 per cent. during the second quarter. This estimate is based on the returns which have so far been received in the census taken at the end of June and which cover over half of the total stocks.

There was a further substantial fall in stocks of sheet. Stocks of tinplate also fell, but there was rise in the stocks of plate. Stocks of other types of steel fell by about the average of 2 per cent. over the whole field.

UK Consumption

On the basis of the figures so far available it is estimated that the use of steel in the home market during the second quarter amounted to a seasonally-corrected figure of 3,690,000 tons, practically the same as during the first quarter. Quarterly figures of the use of steel in the home market during the past few years show considerable fluctuations over the past four and a half years.

Estimated actual UK consumption in the first quarter of 1957 was 3,492,000 tons (seasonally corrected, 3,370,000 tons), and this improved the following year by 0.9 per cent., dropped by 11.5 per cent. in 1959, soared by 21.6 per cent. last year, but only made 1.4 per cent. headway this year. The second quarter's figures for 1957—3,427,000 (3,330,000) tons—made no improvement until last year when they were 14.9 per cent. better. This year they flagged by 2.1 per cent. Similar variations are shown in the figures for the third and fourth quarters.

Latest pig-iron and steel output figures (in tons), with the corresponding 1960 returns, are shown in the following table:—

Period.	Pig-iron.		Steel ingots and castings.	
	Weekly average.	Annual rate.	Weekly average.	Annual rate.
1961—May	300,200	15,610,000	466,100	24,240,000
June	297,400	15,463,000	447,500	23,268,000
July	276,600	14,381,000	380,200	19,771,000
1st 7 months	301,400	15,671,000	457,900	23,811,000
1960—May	299,100	15,554,000	475,400	24,723,000
June	299,200	15,353,000	466,400	24,255,000
July	288,900	15,024,000	391,400	20,355,000
1st 7 months	300,900	15,649,000	465,100	24,183,000

CO_2 from Waste Flue Gases. Publication No. 508 received from the Incandescent Heat Company, Limited, Cornwall Road, Smethwick, Staffs, opens with the following statement "High purity carbon-dioxide gas can now be extricated from waste flue gases . . . by a new plant recently developed by the Incandescent Heat Company, Limited. It will now be possible for foundries . . . dependent on CO_2 as an indispensable part of a process to produce and store their own CO_2 from what is in most cases an unwanted product of combustion." The brochure describes and illustrates the new process.

News in Brief

THE RENFREW SHIPYARD of Simons-Lobnitz, Limited, has beaten world competition to win a contract for six cutter suction dredgers for Malaya.

Mr. LESLIE HOLDBROOK has joined West Instrument, Limited, and will represent the company in N.E. London, Essex, Suffolk, Cambs., and Norfolk.

WITH A VIEW TO INCREASING OUTPUT of precision castings, Samuel Osborn & Company, Limited, are carrying out extensions at their Holbrook foundry.

FOR THE FIRST TIME, over 100,000 tons of steel have been produced in one month at the Pretoria works of the South African Iron and Steel Corporation.

THE THIRD INTERNATIONAL CARAVAN EXHIBITION, is to be staged at Earls Court on September 20, when over 200 caravans will be shown against as natural a background as can be devised in an exhibition hall.

FIFTY ORDERS for power shovels have been placed by Babcock & Wilcox, Limited, with P. B. Dunlop & Company, Limited, a company which went into production on the Irvine (Ayrshire) industrial estate early this year.

TWENTY-THREE BRITISH FIRMS will be exhibiting at the Leipzig Autumn Fair, from September 3 to 10. The Fair is divided into 30 groups, representing 45 countries, and exhibiting in 16 different buildings, covering a total of 137,000 sq. yds.

THE REGISTERED OFFICES of the Vitreous Enamel Development Council have been transferred from 11, Ironmonger Lane, London, E.C.2, to 28, Welbeck Street, London, W.1 ('phone HUNter 2237). General manager of the Council is Commander G. Clarke, F.C.C.S.

WATSON LAIDLAW & COMPANY, LIMITED, 98, Laidlaw Street, Glasgow, have acquired from Strike's Laundry Machinery, of Los Angeles, the sole manufacturing rights and distribution concessions outside the USA and Canada for an automatic hydraulic extractor, which extracts surplus water or liquids from laundered or processed goods.

THE VENEZUELAN MINISTRY OF MINES has stated that the iron ore at Cerro San Isidro, the national reserve's main deposit, is superior in quality to all other known Venezuelan deposits. The average iron content of 61.55 per cent. compares favourably with the deposits of El Pao and Cerro Bolivar, which both average 59 per cent.

THE MANCHESTER OFFICE of the David Brown Corporation (Sales), Limited, moved on August 14 to Ashburton Road, Trafford Park, Manchester 17. At the same time the company's machine-tool division was transferred to these premises from Britannia Works, Sherborne Street, Manchester. The office handles sales of all products of the David Brown gear and foundry groups.

BOWMAKER (PLANT), LIMITED, authorized Caterpillar dealers in the Midlands, Wales and South-West Counties, announce the appointment of six new representatives: Mr. J. Bernhardt, 41 (Cheshire area); Mr. J. A. N. Coates (part of South Wales); Mr. G. H. Ford, 32 (Warwickshire excluding Birmingham and part of Gloucestershire); Mr. A. E. Lewis (West Wales); Mr. R. L. Taylor (North Staffordshire), and Mr. W. S. Pryke (eastern part of South Wales).

THE *Associazione Italiana di Metalurgia* (Italian association of metallurgists) announces the holding of a symposium on the "Surface Treatment of Aluminium" to be held in Milan from October 7 to 9. The provisional programme includes two papers from the UK, two from Japan, with others from France, Germany, Jugoslavia and Switzerland and quite a few from the host country. Details of this important technical meeting are available from 10, Via del Politechnico, Milan, Italy.

DUE TO THE GROWTH of the Tecalemit group of companies, Tecalemit, Limited, has become a holding company only, providing financial, technical and general administration services for all the companies within the group, and a new company, Tecalemit (Engineering) Limited, has been formed to carry out all of the manufacturing, engineering and selling activities previously conducted by Tecalemit, Limited. Mr. S. G. Bates, C.B.E., is the chairman, and Mr. P. R. Scutt the managing director.

THE BOARD OF TRADE ANNOUNCE that the president has not accepted the recommendation made by the Standing Committee (General Merchandise), set up under the Merchandise Marks Act, 1926, in their report to him that imported goods of the following descriptions should be required to bear an indication of origin at the time of importation and sale and exposure for sale in the United Kingdom:—Heat insulating bricks, blocks, tiles of infusorial earths, of diatomaceous earths, of kieselguhr. of siliceous fossil meal or of similar siliceous earth.

THE DONCASTER WORKS of the Ford Motor Company are being prepared for full production of the new Anglia Estate car, which will start production alongside the Popular model now being made there. About 200 key employees have given up or postponed their summer holiday to help in the preparation of the factory, and are working alongside contractors on plant installation and constructional work. The extension scheme is being carried out at a cost of £500,000. Petrol tanks are included in the production line so that new cars leave the assembly line under their own power.

EXTENSIVE DEVELOPMENT WORKS have been carried out at the copper refinery erected by Mt. Isa Mines, Limited, at Stuart, near Townsville, Queensland, to handle the increased production from the company's new £3,500,000 copper smelter at Mt. Isa which will be completed in November. It is expected that as a result of these extensions, the copper refinery's capacity will be increased from 40,000 tons to 75,000 tons a year. Mt. Isa Mines has spent over £6,000,000 on the construction of the refinery, which started production two years ago and employs over 450 people.

A PARTY OF RUSSIANS from Georgia, who have been studying the machine-tool industry in this country, made the last works visit of their 12-day tour on August 1. when they visited the Halifax headquarters of the Asquith Machine Tool Corporation, Limited, and the nearby works of Modern Foundries, Limited, an Asquith subsidiary. The party, led by Mr. Theodor Volkov, had already visited eight other machine-tool concerns, in the Midlands and the London area.

MANUFACTURE OF MASSEY-FERGUSON TRACTORS in Brazil, as approved under the plans of Geimar, the Brazilian Government Agency, will shortly begin. This operation is being undertaken by Massey-Ferguson do Brazil, in association with Vemag SA, distributors of M-F products since 1946. The factory, with a planned capacity for 400 tractors a month, is located in the industrial area of Jaquare, Sao Paulo. The tractors will be powered by Perkins diesel engines now being produced by Motores Perkins SA in Brazil. The Perkins group, manufacturers of diesel engines, is a subsidiary of Massey-Ferguson, Limited.

News in Brief

DOCUMENTS were signed in London on August 9 giving effect to the £2,000,000 loan from the United Kingdom to Chile agreed in principle in October, 1960. The loan, given under Section 3 of the Export Guarantees Act, 1949, for the purchase of United Kingdom goods or services, is to assist the economic recovery of Chile following the 1960 earthquakes. H.E. the Chilean Ambassador to the UK, Mr. Don Victor Santa-Cruz, signed on behalf of Chile, and Mr. L. J. Menzies, secretary of the Export Credits Guarantee Department, on behalf of the United Kingdom. The loan will be repaid over the years 1965-1971.

Dr. D. G. CHRISTOPHERSON, O.B.E., F.R.S., Pro-Vice-Chancellor of the University of Durham and Warden of the Durham Colleges, has accepted an invitation to give the first annual lecture of the British Conference on Automation and Computation (BCAC). He will speak on the subject, "Mathematics—Friend or Foe?" at the Lecture Theatre of the Institution of Electrical Engineers, Savoy Place, London, W.C.2, September 27, at 5.30 p.m. The lecture is open to all members of the 31 member societies of BCAC; others should apply for tickets (free) from the honorary secretary, BCAC, c/o The Institution of Electrical Engineers, Savoy Place, London, W.C.2.

AN AEROPLANE for the Davy-Ashmore, Limited, company of Sheffield was received by Mr. Maurice A. Fiennes, group managing director of Davy-Ashmore, who was accompanied by Mr. M. F. Dowding, managing director of Davy & United Engineering, Limited, on August 1. The new aeroplane, a Beechcraft Queen Air, a twin-engined monoplane, was delivered from Short Bros. & Harland, Limited, of Belfast. The aircraft, which contains work tables and adjustable seating and can be turned into an office in the sky, can carry six passengers and baggage non-stop 1,000 miles in just over five hours. It will be used to maintain closer contact between the group's manufacturing centres in this country and branches overseas.

AUSTRALIA'S BIGGEST CAR MANUFACTURING COMPANY, General Motors-Holden's, Limited, announced in Melbourne on August 4 that it intended to start laying off immediately 1,200 men at its plants in Victoria and and South Australia. The lay-off period will extend over two weeks. Nearly all the employees affected are members of the Vehicle Builders' Union. Since the Federal Government imposed credit restrictions last November, General Motors-Holden's have put off more than 4,000 workers. In June, when the company put off 3,000 employees, a spokesman stated that they represented 12 per cent. of the company's work force. Recently Australian Motor Industries announced heavy price reductions for some cars to clear surplus stocks worth £A1,000,000.

DETAILS of investments in the foundry and machine industries in Hungary were given recently in Budapest by Mr. Géza Gazda, head of the development department of the Ministry covering such industries. The second greatest programme, he said, was the reconstruction of the old Ozd steelworks where 400 million forints (100=£3) were being spent on development and rebuilding of the foundry. Completion of the programme should raise production by 150,000 tons a year; the new oxygen factory there would have an output of 12 million cu. m., he added. Mr. Gazda listed various smaller developments and added that Hungary was spending 1,080 million forints this year on improved mechanization and the introduction of new types of automatic machines in industry.

Purchasing Officers Association Conference

The opening address at the 1961 Conference of the Purchasing Officers Association at the Hotel Metropole, Brighton, from September 28 to 30, will be given by the Right Hon. Edward Heath, M.B.E., M.P., Lord Privy Seal, who will talk on "The Common Market." The problem of "Late Deliveries" will be ventilated by Dr. E. N. Hague, M.SC., PH.D., purchasing manager, Shell Petroleum Company, Limited, who will present a paper on this subject and take part in a discussion with Mr. Norman Fraser, M.A., chairman, British Chemical Plant Manufacturers Association.

Technical Sessions

Sectional meetings will cover the following topics:—"Make or Buy"; "Paint"; "Buying Transport"; "Stimulating Competition"; "Timber," and "The Buyer's Rôle in Quality Control." Mr. T. L. Garner, M.SC., managing director of Precision Rubbers, Limited, Bagworth, Leicester, who has been invited to give this year's Swinbank Lecture, will be speaking about "Taking Stock." (The Swinbank Medal is awarded annually for outstanding service to the purchasing profession.) Mr. Garner, a past-president of the Association, is also the current president of the European Federation of Purchasing.

The first day of the conference will be visitors' day at the POA Minibition, and in the evening at 6.30 p.m. Mr. W. H. Parry will deliver his presidential address. Social events include a civic reception and dance at the Grand Hotel on the Thursday evening, and on the Saturday, golf, bowls and tennis tournaments, concluding with a dinner/dance at the Grand Hotel in the evening.

Buyers for industrial concerns who would like a complete copy of the programme are invited to write to the secretary of the Purchasing Officers Association, Wardrobe Court, 146a, Queen Victoria Street, London, E.C.4.

Obituary

The death has occurred at the age of 61 of Mr. FRED HATTERSLEY, managing director of the Junction Ironworks, Limited, Welbeck Street, Ashton-under-Lyne.

The death is announced of Mr. ALFRED OGLE, managing director of G. C. Ogle & Sons, Limited, agricultural engineers and ironfounders, of Ripley, Derbyshire, until his retirement a few years ago. Mr. Ogle had been associated with the firm all his business life. He was 84.

Mr. ALEXANDER COUPAR, who has died at the age of 60, was a prominent ironfounder and was well-known throughout the iron trade in Central Scotland. On the death of his father 19 years ago he took over the management of Dunipace Iron Foundry, and when it became a limited company last year, he was appointed managing director of the firm.

The death is reported of Mr. GEORGE H. JACKSON, at the age of 72, as a result of a motor accident in Derbyshire. He was chairman of Chaseside Engineering Company, Limited, until 1958 when he relinquished his connection with the company on its amalgamation that year with British Northrop, Limited, of Blackburn. Mr. Jackson was the originator in Europe of the mobile loading shovel and produced his first Chaseside loader as early as 1925.

Publications Received

Proceedings of the Hungarian Research Institute for Non-ferrous Metals, volume IV (1960), published from Budapest.

This report consists of a collection of 32 papers, sub-divided into three sections, *viz.*, alumina production, aluminium metallurgy; aluminium and its alloys and other non-ferrous metals and their alloys. Abstracts are included in Russian, German and English and what follow are synopses of some of the papers of particular interest to foundrymen:—

On the subject of "Castability, Hot- and Cold-working and Heat-treatment of an Al/Mg/Zn-type Alloy in Pilot Plant and Plant Conditions," the author, Mr. Z. Buray, deals with the fabrication technology of the alloy "Hegal." He states that melting and semi-continuous water-cooled billet casting of the alloy is no more critical than in the case of an Al/Mg3-type alloy and that the correctly-treated alloy is not at all prone to casting cracks. In hot-forming the manganese-free type, the manganese-containing types are more easily rolled and pressed than Al/Mg3 to Al/Mg 4, 5. Edge-cracking of the alloy uncontaminated by oxides and other inclusions is hardly more pronounced than with an Al/Mg/Si-type alloy. Cold rolling should be preceded by a six to eight-hr. homogenizing treatment at 400 deg. C. The author goes on to state that the alloy being investigated can be subjected to an ageing treatment, but it is not sensitive as to homogenizing temperature and cooling rate. Optimum strength values are obtained after natural ageing following on a homogenizing treatment of one to two hours' duration at 430 ±10 deg. C. and water-cooling. After 30 days, the alloy is already hardened, but an increase in strength may be observed after 180 days. At this point, the tensile strength of the alloy is 35 kg. per sq. mm. (22.2 tons per sq. in.), the yield strength is 21 kg. per sq. mm. (13.3 tons per sq. in.) and elongation 20 per cent. A stable soft condition can be brought about by a six to eight-hour heat-treatment at 300 deg. C. and slow cooling (20 deg. C. per hr.). The experiments detailed by the author include investigations of the influence exercised on the alloy by certain technological variables. Since according to the experiments described, "Hegal" has good weldability and after natural ageing the strength of the welded joint is practically equal to that of the base material, welded elements, fabricated from this alloy, will be included experimentally in the mechanically-stressed parts of vehicles and other load-bearing structures, concludes the author.

Pure Aluminium Castings

In another paper, Mr. R. K. Vassel deals with investigation of the physical properties of cast pure aluminium samples. He states that the characteristical composition and several physical properties of aluminium samples of 99.5 per cent. purity, cast semi-continuously and into different moulds in laboratory and under various plant conditions were investigated statistically. In addition to the usual macroscopic and microscopic structural investigations and the measurement of electrical conductivity, physical measurements included the determination of the resistance to tensile, compressive and torsional stress, the deformability under such stress and of the coefficient of heat expansion which are less usual values for such a material in these states. The development of the structure visible macroscopically and under the ordinary microscope depends to a high degree on the solidification rate; in samples of identical composition, a proportional change was also found in electrical conductivity. On heat-treating the cast samples, an optimum of conductivity was found around 400 to 450 deg. C., independent of the structure. The parameters of true loading capacity, flow limit, regular elongation, contraction and specific torsion representing definite energy levels were found often to exhibit considerable variation in a single sample or bar, which could be explained by the non-homogeneous structure of the cast and rolled bars investigated. Further experiments and measurements are needed to determine to what extent the other important factor—internal stresses which unavoidably develop especially in large bars—can influence the uniformity of the data.

According to the diagrams included in this paper, which represent the coefficient of heat-expansion as a function of temperature, the shape of the curves is decisively influenced by the Fe:Si ratio of the samples, but, states the author, the influence of the solidification rate and of the more-important additive impurities cannot be neglected. If the Fe:Si ratio is high and cooling is rapid, the coefficient of heat-expansion/temperature curve will have a continuously-ascending character between 20 and 600 deg. C. Otherwise contractions of different magnitude are detectable around 300 and 500 to 600 deg. C. which probably materially influence the behaviour of these materials during further processing and utilization. This latter problem, states the author, is to be investigated further.

Surface Oxide

In a paper on the formation of oxide layers on the surface of aluminium, the authors (Mr. A. Domony and Mr. E. Lichtenberger) state that the results of experiments carried out has led to the conclusion that hydration and other constitutional changes of oxide layers of different structure forming on the surface of aluminium depend not only on the conditions of environment (principally on the temperature), but are also influenced to a large extent by the aluminium ions diffusing out from the metal. It is due to the influence of the latter that the structural changes of the protective layer formed on an aluminium surface in water at less than 100 deg. C. temperature (or at a higher temperature and pressure) and that of the amorphous aluminium-oxide layer prepared by anodic oxidation are different from the behaviour of an oxide hydrate not in contact with the metal.

Another paper, of which Mr. Lichtenberger is the sole author, also deals with the subject of oxide layers and describes investigations carried out on the conditions of formation of hard anodic oxide layers in 1 per cent. H_2SO_4 at +1 deg. C., with an anodic oxidation potential of 20 to 80 v. The author states that oxidation starts at the crystal boundraries, the number and distribution of initial oxide nuclei depending on the quality of the metal. The growth of the oxide layer is also influenced by the structure of the metal. Base patterns obtained depend on the composition and previous history of the metal (rolling, heat-treatment) and by measuring the smoothness of the base patterns, the start of oxidation and the influence exercised by working conditions and the composition of the material on the anodic oxidation may be studied.

Soviet Science in English—a catalogue published by Program for Scientific Translations, 14, Shammai Street, Jerusalem, Israel.

This priced catalogue covers a wide range of sciences, and under metallurgy, lists nine books on this subject.

Imports and Exports of Iron and Steel in June

The following tables, based on Board of Trade returns, give figures of imports and exports of iron and steel in June this year. Totals for the first six months of 1960 and 1961 are also included.

Total Exports of Iron and Steel

Destination.	Month ended June 30.	Six months ended June 30.	
	1961.	1960.	1961.
	Tons.	Tons.	Tons.
Malta	474	3,775	3,044
Sierra Leone	906	2,809	5,904
Ghana	1,281	9,980	9,446
Nigeria	4,079	30,989	38,740
Union of South Africa	4,743	39,903	32,830
South-West Africa	1,038	4,603	8,211
Rhodesia and Nyasaland	2,681	13,152	18,573
Tanganyika	3,232	6,356	15,002
Kenya	2,867	15,062	20,378
Uganda	122	683	2,230
Mauritius	118	2,276	1,237
Bahrein, Qatar, and Trucial States	676	8,324	10,021
Kuwait	602	4,211	10,938
India	17,209	127,378	108,036
Pakistan	16,258	35,072	47,879
Singapore	1,828	9,638	14,877
Malaya	1,601	10,561	14,043
Ceylon	4,198	30,022	23,624
British North Borneo	43	2,278	1,170
Hongkong	9,867	42,466	40,993
Australia	5,886	83,924	81,259
New Zealand	13,736	50,737	142,431
Canada	10,991	127,410	71,343
Jamaica	1,351	12,811	9,116
Trinidad	4,909	22,450	22,909
British Guiana	945	4,577	5,275
Other Commonwealth countries	3,347	13,555	14,839
Eire	5,420	30,694	37,464
Soviet Union	1,387	16,969	11,940
Finland	5,401	22,855	30,942
Sweden	13,854	94,685	90,097
Norway	9,749	63,472	66,948
Denmark	11,895	50,808	48,748
Poland	1,837	5,495	12,649
Western Germany	10,272	78,856	52,152
Eastern Germany	3,426	12,771	13,915
Netherlands	8,757	66,205	69,990
Belgium	1,485	19,854	14,753
France	1,184	3,289	6,969
Switzerland	2,099	6,440	12,290
Portugal	2,240	7,980	13,336
Spain	1,439	26,668	11,658
Italy	5,581	21,423	34,331
Austria	365	2,677	2,712
Yugoslavia	463	21,804	19,101
Greece	4,537	8,231	19,181
Turkey	1,119	5,911	9,462
Netherlands Antilles	49	2,262	434
Portuguese East Africa	160	2,062	1,531
Egypt	323	6,568	17,170
Libya	572	7,020	4,920
Sudan	1,327	5,094	5,181
Israel	3,023	11,243	12,682
Saudi Arabia	36	214	746
Iraq	922	15,184	22,196
Iran	4,054	37,676	18,407
Burma	606	4,071	2,987
Thailand	426	3,154	2,995
Indonesia	73	15,049	2,632
China	360	31,171	10,085
Japan	32,313	40,306	85,553
Philippine Republic	497	4,884	2,371
USA	10,750	140,782	65,361
Cuba	72	5,202	847
Mexico	127	4,015	2,118
Colombia	471	5,166	5,875
Venezuela	2,984	22,871	13,107
Ecuador	110	1,528	1,555
Peru	823	3,441	4,692
Chile	240	1,622	2,051
Brazil	2,143	19,855	10,637
Uruguay	737	4,983	4,931
Argentina	16,560	49,585	85,291
Other foreign countries	8,186	34,061	38,689
TOTAL	295,442	1,760,958	1,778,030

Sir DOUGLAS THOMSON has been appointed a director of Amalgamated Metal Corporation, Limited.

Total Imports of Iron and Steel

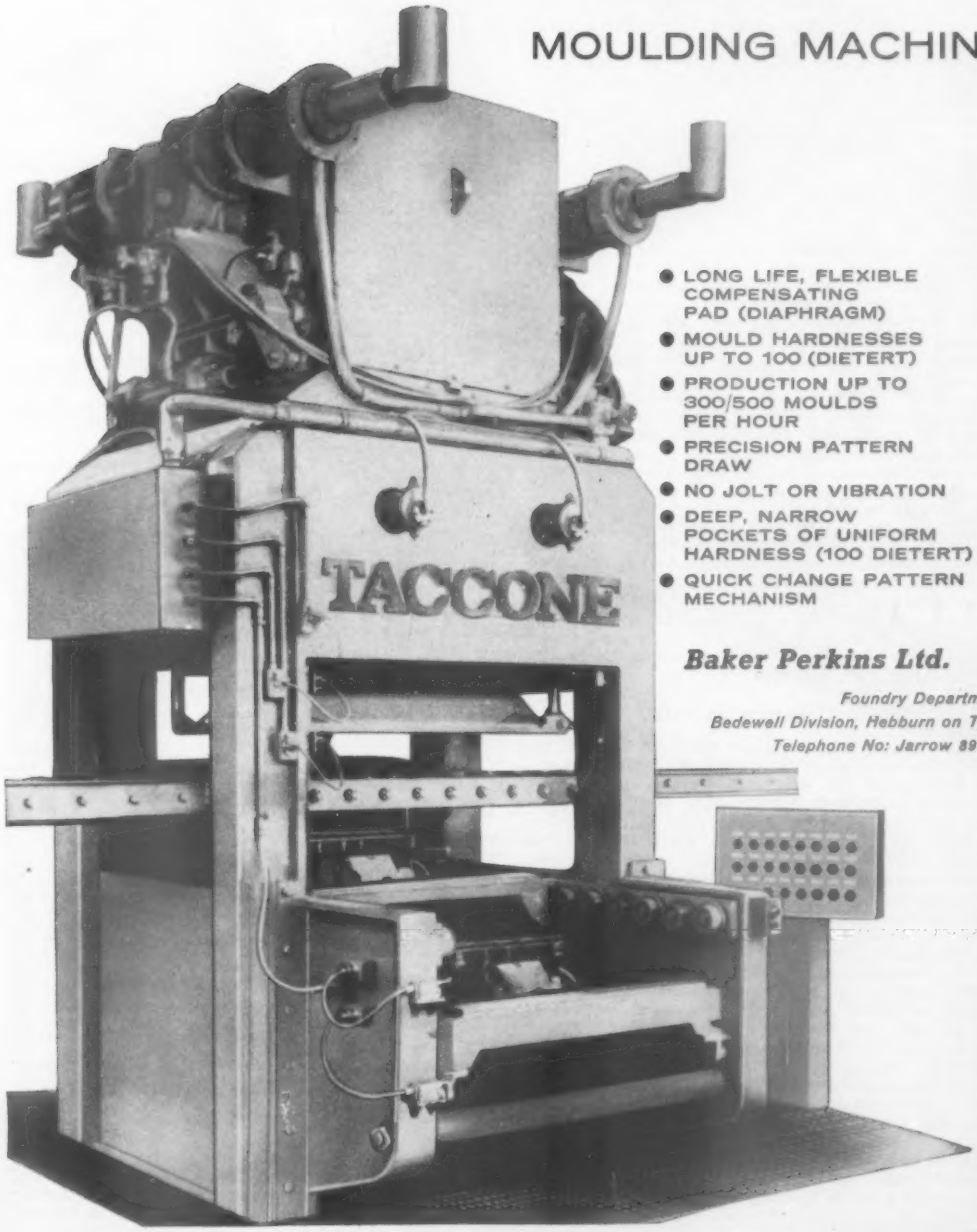
From	Month ended June 30.	Six months ended June 30.	
	1961.	1960.	1961.
	Tons.	Tons.	Tons.
Union of South Africa	2,707	19,003	19,708
Rhodesia and Nyasaland	577	3,834	17,424
Canada	2,179	45,543	60,146
Other Commonwealth countries and Eire	3,110	14,810	17,294
Soviet Union	584	17,685	9,923
Sweden	4,277	24,004	27,678
Norway	10,963	75,948	60,272
Poland	90	7,917	652
Western Germany	1,436	79,168	16,342
Netherlands	10,566	113,922	59,668
Belgium	1,697	61,151	23,345
Luxembourg	—	8,027	10,019
France	963	35,580	11,445
Italy	15	17,077	265
Austria	129	6,621	2,754
Japan	704	3,448	3,893
USA	1,087	175,087	7,834
Other foreign countries	556	46,913	6,620
TOTAL	41,740	755,738	355,282
Iron and steel scrap and waste fit only for the recovery of metal	2,244	72,653	11,902

Exports of Iron and Steel, by Product

Product.	Month ended June 30.	Six months ended June 30.	
	1961.	1960.	1961.
	Tons.	Tons.	Tons.
Pig-iron	7,416	92,500	48,729
Ferro-columbium (niobium)	18	74	37
Ferro-tungsten	139	486	581
Other ferro-alloys	259	5,661	1,872
Ingots, blooms, billets, slabs, sheet bars (incl. tinplate bars) and similar primary forms	15,924	20,543	54,753
Pieces roughly shaped by forging	262	811	1,311
Iron bars, rods, angles, shapes, and sections	196	851	1,151
Steel bars, rods, angles, sections, and shapes	59,009	326,221	363,305
Iron plates and sheets	26	415	240
Universal plates	801	10,495	8,461
Steel plate, 3 mm. and under 4.5 mm. thickness	4,363	20,669	20,251
Ditto, 4.5 mm. or more in thickness	34,813	175,584	180,725
Blacksheets and blackplate	36,979	153,308	197,608
Hoop and strip	8,355	50,735	63,307
Tinplate	34,966	275,192	224,591
Decorated tinplate	475	2,366	3,636
Galvanized sheets	6,182	42,566	37,779
Other (incl. tinned sheets, terneplate, and ternesheets)	3,315	15,085	21,141
Railway and tramway construction material	16,472	80,967	114,383
Wire rods of steel (incl. alloy steel)	7,305	28,646	34,526
Wire	12,040	63,740	70,054
Tubes, pipes, and fittings	46,047	394,052	329,589
TOTAL	295,442	1,760,458	1,778,030

Mr. E. W. B. OWEN, Mr. E. M. DE WINDT and Mr. R. K. NELSON have joined the board of Eaton Axles, Limited. Mr. Owen is joint managing director of Rubery Owen & Company, Limited, and Mr. de Windt is vice-president of Eaton Manufacturing Company, Limited, associated companies of Eaton Axles.

THE NEW TACCONE HYDRA-PNEUMATIC MOULDING MACHINE



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Raw Material Markets

Iron and Steel

Holiday influences continue to minimize production of castings at the iron foundries. A return to work will be made at many establishments next Monday, which will include practically the whole of the foundries in the Birmingham and South Staffordshire areas, but until the end of the month outputs will continue to be affected. Deliveries of materials are under suspension and will not be released until the foundries re-open. Stocks on hand of pig-iron, scrap, coke, etc., will be sufficient for resumption of production and the present easy supply position of these materials will enable consumers to obtain prompt deliveries of additional supplies.

While the amount of business on hand varies according to the type of castings, most makers have capacity to spare and would welcome additional orders. The engineering and speciality foundries are in the most favourable position, as they have been for a long time past, but are not now so heavily committed as they were, and their forward position is not so secure. Recent production of high-quality castings has been in excess of fresh bookings and makers are anxious to see this position reversed if they are to maintain outputs at recent levels. The light, jobbing and textile foundries are also striving to obtain increased business, as many of them are operating well below capacity.

Many of the re-rollers are now closed for annual holiday and production will be on a much reduced scale until the end of the month. They are hoping that, on return to work, business will show an improvement on that recently obtained, as demand for most of their products has been on a decreasing scale, particularly for small bars, light sections, strip and bright drawn bars. Reinforcing rods and bars continue to be taken up in appreciable tonnages.

Available supplies of mild steel semis are much in excess of demands and home steelworks have tonnages to spare. Carbon steel billets are in fairly good supply but the works producing alloy steels are mostly heavily committed for their outputs.

Non-ferrous Metals

Strikes at four major copper plants in Chile is the chief factor sustaining the copper market in London. Yet, because of the weight of supplies overhanging the market and the fact that this is the slack season, prices have not reflected the fact that the four mines concerned produce between them about an eighth of the total world's output of copper. Indeed, not even the disturbances in the Copperbelt which show no signs of abating had much effect on the market. The fact is that markets are quiet and will remain so until the end of the holiday season. The US market is quiet with the price unchanged at 31 cents a pound.

In tin, the Singapore market is strong and is carrying the London and New York markets. The fact is that the statistical position for the metal remains as tight as ever and hopes are that a higher "floor" price will be established at the Tin Council's meeting next week. Meanwhile, the US quotation is following that of Singapore and has risen to around $1.19 a pound. The outlook continues bright and there are an increasing number of observers of the metal scene who feel that there may well be a major advance in the metal price in the not too distant future.

Lead is quiet on both sides of the Atlantic. In London the price is moving narrowly around £65 a ton, while in New York the quotation is unchanged at 11 cents a pound.

Zinc is receiving only modest support in London and the price is steady around £77 a ton. In the US the quotation for East St. Louis spot metal is unaltered at 11½ cents a pound.

Increases of Capital

MIDLAND ALUMINIUM, LIMITED, increased by £415,000, in 5s. ordinary shares, beyond the registered capital of £825,000.

EXPANDITE, LIMITED, London, N.W.10, increased by £250,000, in 2s. 6d. ordinary shares, beyond the registered capital of £250,000.

POWER UNIT ENGINEERING, LIMITED, Leeds, increased by £22,000, in £1 ordinary shares, beyond the registered capital of £3,000.

BERYLLIUM & COPPER ALLOYS, LIMITED, London, S.W.1, increased by £9,000, in £1 ordinary shares, beyond the registered capital of £1,000.

MACREADY'S METAL COMPANY, LIMITED, London, N.1, increased by £290,000, in 5s. ordinary shares, beyond the registered capital of £210,000.

SHEFFIELD SMELTING COMPANY, LIMITED, Sheffield, increased by £900,000, in £1 ordinary shares, beyond the registered capital of £600,000.

WEST MIDLAND STEEL STOCKHOLDERS, LIMITED, Birmingham, increased by £4,000, in £1 ordinary shares, beyond the registered capital of £1,000.

DARROLD ENGINEERING COMPANY, LIMITED, Lye (Worcs), increased by £15,000, in £1 ordinary shares, beyond the registered capital of £10,000.

AURORA GEAR & ENGINEERING COMPANY, LIMITED, Sheffield, increased by £250,000, in 1s. ordinary shares, beyond the registered capital of £500,000.

DUDLEY HILL ENGINEERING COMPANY, LIMITED, Lytham (Lancs), increased by £24,000, in £1 ordinary shares, beyond the registered capital of £1,000.

INTERNATIONAL MEHANITE METAL COMPANY, LIMITED (Surrey), increased by £40,000, in £1 ordinary shares, beyond the registered capital of £10,000.

TOLEDO WOODHEAD SPRINGS, LIMITED, Aycliffe (Co. Durham), increased by £300,000, in 4s. ordinary shares, beyond the registered capital of £200,000.

INASCO, LIMITED, iron and steel merchants, etc., of London, E.C.2, increased by £19,900, in £1 ordinary shares, beyond the registered capital of £100.

E. A. FOULDS, LIMITED, iron masters and founders, etc., of Colne (Lancs), increased by £19,000, in £1 shares, beyond the registered capital of £1,000.

FERRO METAL & CHEMICAL CORPORATION, LIMITED, of London, W.C.1, increased by £40,000, in £1 ordinary shares, beyond the registered capital of £10,000.

SHARMAN & LADBURY LIMITED, iron, steel, and metal merchants, etc., of Melton Mowbray, increased by £72,000, in £1 ordinary shares, beyond the registered capital of £3,000.

ENTONES (METAL BROKERS), LIMITED (formerly Copeley Metals, Limited), London, E.C.2, increased by £30,000, in £1 ordinary shares, beyond the registered capital of £20,000.

MORLEYS (BIRMINGHAM), LIMITED, iron, steel, and metal merchants, etc., of Birmingham, increased by £40,000, in £1 ordinary shares, beyond the registered capital of £60,000.

A.P.V. COMPANY, LIMITED, makers of stainless steel and alloy vessels, etc., of Crawley (Sussex), increased by £250,000, in 10s. ordinary shares, beyond the registered capital of £2,150,000.

WESTCOTT, LIMITED, electrical and mechanical dril manufacturers, etc., of London, E.C.3, increased by £180,000, in £1 ordinary shares, beyond the registered capital of £20,000.

STAR ENGINEERING COMPANY (WORCESTER), LIMITED, Worcester, increased by £2,000, in £1 6 per cent. cumulative redeemable preference shares, beyond the registered capital of £15,000.

W. P. B. BUTTERFIELD, LIMITED, tank manufacturers, etc., of Shipley, increased by £500,000, in £1 5½ per cent. cumulative preference shares, beyond the registered capital of £1,500,000.

KARRENA FURNACE ENGINEERING, LIMITED, London, E.C.2, increased by £7,000, in 1,000 preference shares of £1 and £24,000 ordinary shares of 5s. each, beyond the registered capital of £8,000.

BLACK-CLAWSON INTERNATIONAL, LIMITED, manufacturers of papermill machinery, etc., of London, W.1, increased by £250,000, in 10s. ordinary shares, beyond the registered capital of £1,000,000.

F. E. WEATHERILL, LIMITED, mechanical handling equipment manufacturers, etc., of Welwyn Garden City (Herts), increased by £196,500, in £1 ordinary shares, beyond the registered capital of £3,500.

IN LAST WEEK'S ISSUE the address of Cleanair, Limited, was incorrectly quoted as Linslade, Leighton Buzzard, Bucks, whereas of course Leighton Buzzard is in Bedfordshire.

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ALAG is a synthetic aggregate which, when used with CIMENT FONDU, PRODUCES CONCRETE WITH THE FOLLOWING UNIQUE PROPERTIES :-

EXTREME RESISTANCE TO ABRASION
(Hardness of aggregate 7·5 MOHS. Cuts glass)

ENORMOUSLY HIGH STRENGTH IN A MATTER OF HOURS
(For example 12,000 lb. per sq. inch at 24 hours and 16,000 lb. per sq. inch at 7 days)

HIGH DENSITY
(167 lb. per cu. ft. air-dried—20 lb. per cu. ft. higher than normal)

HEAT RESISTANT
(up to 1,150/1,200°C.)

OR ALL ABOVE PROPERTIES COMBINED

SHOULD BE USED ONLY WITH HIGH ALUMINA CEMENT (CIMENT FONDU)

Write for further information. ALAG is available only from :—

LAFARGE ALUMINOUS CEMENT COMPANY LIMITED

73 BROOK STREET, LONDON, W.1 TELEPHONE: MAYFAIR 8546

AP91

Current Prices of Iron, Steel, and Non-ferrous Metals

(Basis prices, delivered unless otherwise stated. Prices following side headings marked* are subject to an increase of 1 per cent. under Iron and Steel Board Price Determination, 1961, No. 2.)

August 16, 1961

PIG-IRON

* **Foundry Iron.**—No. 3 IRON, CLASS 2, 10-ton lots or over, Middlesbrough, £21 17s. 0d.; Birmingham, £21 9s. 3d.

* **Low-phosphorus Iron.**—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham; £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.; North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

* **Hematite.**—Si less than 2 per cent, S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £23 19s. 0d.; Scotland (Scotch iron), Zone S.1, £24 5s. 6d.; Sheffield, £25 9s. 0d.; Birmingham, £25 13s. 0d.; South Wales (Welsh iron), £23 19s. 0d.

* **Basic Pig-iron.**—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(*per ton unless otherwise stated, delivered*)

Ferro-Silicon (6-ton lots and over).—45 per cent. Si, £45 0s. 0d. to £48 0s. 0d., scale 15s. 0d. per unit, lumpy, 75 per cent. Si, £62 0s. 0d. to £66 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 14s.1d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 10s. 3d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 13s. 3d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £81 10s. 0d. to £84 10s. 0d., basis 60per cent. Cr scale 27s. 0d. to 28s. 6d. per unit; over 6 per cent. C, £79 0s. 0d. to £82 10s. 0d., basis 60 per cent. Cr, scale, 27s. 0d. to 28s. 6d. per unit; 2 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 1 per cent. C,* 1s. 8d. to 1s. 11½d. per lb. Cr; 0.15 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr.; 0.10 per cent. C,* 1s. 9¾d. to 2s. 0¾d. per lb. Cr; 0.06 per cent. C,* 1s. 11d. to 2s. 1d. per lb. Cr. * Average 68-70 per cent.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £275 0s. 0d.; 96/98 per cent., £285 0s. 0d.

Ferro-columbium.—65/67 per cent. Cb + Ta, 19s. 0d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £58 10s. 0d.

SEMI-FINISHED STEEL

* **Re-rolling Billets, Blooms, and Slabs.**—BASIC: Soft u.t.s. 100 tons and over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 100 tons and over, £32 5s. 6d.; hard (0.41 to 0.60 per cent. C), 50 tons and over, £33 17s. 0d.; silico-manganese, 50 tons and over, £42 16s. 6d.; free-cutting, 50 tons and over, £35 4s. 6d. SIEMENS MARTIN ACID (50 tons and over): Up to 0.25 per cent. C; £40 11s. 0d.; silico-manganese, £43 4s. 0d.

* **Billets, Blooms, and Slabs for Forging and for Stamping** 50 tons and over).—BASIC: Soft, up to 0.33 per cent. C, £37 0s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £38 2s. 6d.; acid, up to 0.25 per cent. C, £41 14s. 0d.

FINISHED STEEL

* **Heavy Plates and Sections** (50 tons and over).—Ship plate (N.-E. Coast), £40 7s. 0d.; boiler plates (N.-E. Coast), £42 17s. 0d.; floor plates (N.-E. Coast), £41 16s. 0d.; angles (N.-E. Coast), £38 1s. 6d.; joists (N.-E. Coast), £37 17s. 6d.

* **Small Bars, Sheets, etc.**—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 6d.; under 4 tons to 2 tons, £41 3s. 6d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £67 4s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £67 16s. 0d.; nickel-chrome, £100 18s. 0d.; nickel-chrome-molybdenum, £113 11s. 0d., in lots of 25 tons and over.

NON-FERROUS METALS

Copper.—Cash, £230 15s. 0d. to £231 0s. 0d.; three months, £234 0s. 0d. to £234 5s. 0d.; settlement, £231 0s. 0d.

Copper, Tubes, etc.—Solid-drawn tubes, 2s. 2¾d. per lb. rods, 246s. 0d. per cwt. basis; 20 s.w.g., 281s. 0d. per cwt.

Tin.—Cash, £941 10s. 0d. to £942 0s. 0d.; three months £954 10s. 0d. to £955 0s. 0d.; settlement, £942 0s. 0d.

Lead (Refined Pig).—Second half August, £64 5s. 0d. to £64 7s. 6d.; second half November, £65 15s. 0d. to £65 17s. 6d settlement, £64 7s. 6d.

Zinc.—Second half August, £76 15s. 0d. to £76 17s. 6d.; second half November,£77 15s. 0d. to £77 17s. 6d.; settlement, £76 17s. 6d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £114 7s. 6d.; rolled zinc (boiler plates), all English destinations, £112 12s. 6d.; zinc oxide (Red Seal); d/d buyers' premises, £92 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes 1s. 9¾d. per lb.; sheets to 10 w.g., 198s. 9d. per cwt.; wire, 2s. 8¼d.; rolled metal, 198s. 9d. per cwt.

Brass (Brazing).—BS1400, B3, £176; B6, £223.

Brass (High Tensile).—BS1400, HTB1, £193; HTB2, £214; HTB3, £229.

Gunmetal.—BS1400, LG2, £218; LG3, £228; G1, 1% £298; G1, 1%, £288.

Phosphor Bronze.—BS1400, PB1 (AID released), £315; BS1400, 90/10/1, £303.

Leaded Phosphor Bronze.—BS1400, LPB1, £241.

Phosphor Bronze Strip, etc.—Strip, 297s. 3d. per cwt.; wire, 4s. 2d. per lb.; rods, 3s. 4¾d.; tubes, 3s. 4¾d.; chill cast bars, solids 3s. 5d.; cored, 3s. 6d. (CHARLES CLIFFORD LIMITED).

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 11½d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 4½d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 3½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 2½d. to 2s. 3d. per lb.; Antimony, English, 99 per cent., £230 0s. 0d. Quicksilver, ex-warehouse, £63 0s. 0d. Nickel, £660 0s. 0d. Aluminium, ingots, £186 0s. 0d.; aluminium bronze (BS1400), AB1, £242; AB2, £250.

Company News

Edgar Allen & Company, Limited

The reorganization of Edgar Allen & Company, Limited, the Sheffield steel and engineering group, with the object of expanding business and earning capacity would call for further capital investment in plant and equipment, as well as additional working capital, said Mr. W. H. Higginbotham, chairman at the annual meeting. The directors were considering a scrip issue and raising new money. For this purpose authorized capital should be increased, and it was hoped to submit proposals to members before the end of the present financial year.

Included with the chairman's statement is a review showing the shift in emphasis of demand and proportionate profitability of the various sectors of the group over the past four years. Profits from steel and steel-making have increased from 35 to 60 per cent. of the group total; those from steel castings have fallen from 30 to 26 per cent.; and engineering and track-work show a drop from 35 to 12 per cent.

In the engineering department there was no contract work of any importance during the year, but Mr. Higginbotham reports a much greater current volume of inquiry, particularly for cement-making plant and equipment.

JOHN BROWN LAND BOILERS, LIMITED—All the share capital of P.H.I. Engineering, Limited, coal and raw material pulverizers, of London, S.W.1, has been acquired by the company, a wholly-owned subsidiary of John Brown & Company, Limited.

BORAX (HOLDINGS), LIMITED—The directors have declared an interim dividend in respect of the year to September 30, 1961, of 4 per cent. on the deferred ordinary stock subject to deduction of income tax. The dividend will be payable on September 13.

UNITED GAS INDUSTRIES, LIMITED, London, W.C.2—Group net profit for the year ended March 31, 1961, is £157,742 (loss £167,672) and the ordinary dividend is increased to 12½ (2½) per cent. The reorganization of the company's activities into three divisions has continued and the resulting benefits are already reflected, states the chairman, Mr. H. H. Bates.

WALMSLEY (BURY) GROUP, LIMITED, makers of pulp and paper-making machinery, iron and non-ferrous castings, etc., of Bury (Lancs)—Shares have been issued to the group by Perry Engineering Company, Limited, South Australian mechanical and structural engineers. The issue, consisting of 120,000 ordinary 10s. shares in Perry at 15s. premium will raise £A150,000 which will be used to buy tools and plant for expansion. Perry has entered into an agreement to make Walmsley paper-making and pulping equipment in Australia.

RICHARDSONS, WESTGARTH & COMPANY, LIMITED—In view of the changing pattern of demand as between marine engineering and land-based power-plant industries, there would have to be greater dependence on land work in the future, Mr. O. J. Phillipson, chairman, told the annual meeting. Major changes were under way to improve efficiency in production and administration, he said. It had been decided to change from the relatively self-contained subsidiary company structure to centralized control. An exception would be made for the Humber Graving Dock & Engineering Company, Limited, because of the nature of its business and location. This policy would require changes among the group's senior executives.

PIG IRON, All Grades
METALLIC ABRASIVES
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CLASSIFIED ADVERTISEMENTS

SITUATIONS WANTED

FOUNDRY DIRECTOR (37), A.I.M., M.I.B.F., with present company 12 years, desires change. Experience covers all aspects grey iron and non-ferrous castings production. Salary required £2,000. Box FD846, FOUNDRY TRADE JOURNAL.

PRACTICAL FOUNDRYMAN wishes opportunity to build up non tied Jobbing Iron Foundry with view to Directorship. Would consider partnership. Fully experienced metallurgical control and modern production techniques. Knowledge of sales promotion through technical publicity. Proved record of initiative and drive. Any proposals considered. Write Box PF894, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

EIFFEL FOUNDRY

A SUBSTANTIAL Jobbing Foundry making castings from 10 cwt. to 30 tons are looking for a suitable successor to the late Mr. Arthur Livingstone, a founder director who was responsible for sales representation and customer liaison generally. Applicants should possess a tactful and amiable personality and have previous experience in this sphere along with practical foundry experience.

Remuneration would be subject to negotiation at a personal interview as the position is one offering above average prospects.

Apply in writing to the SECRETARY, EIFFEL FOUNDRY CO. LTD., Moss Lane, Walkden, Lancs.

FOUNDRY FOREMAN (Manager), good sound practical experience. Aged 35-45, for grey iron and malleable Foundry in Walsall. Able to manage and recruit labour. Salary plus share of profits. Write giving details experience to Box FF889, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER required for Pig Iron producing Works, to be responsible for make-up of charge, running of plant and control of labour. Applicant must have metallurgical knowledge and be experienced in handling labour. Some knowledge of Hot Blast operation an advantage. Pension Scheme in operation and assistance given with housing if required. Please write giving details of experience and present salary to: Box FM898, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*contd.*

FOUNDRY MANAGER required to take charge of small grey-iron jobbing foundry in Central Scotland.

The successful applicant must be accustomed to handling labour and have a first class practical and good technical knowledge of all phases of grey-iron foundry practice. The ability to estimate from engineering drawings is essential.

The salary of not less than £1,200 p.a. will be in accordance with qualification and experience and a contributory pension scheme and free life assurance scheme is operated.

Apply in confidence giving full details to Box FM896, FOUNDRY TRADE JOURNAL.

EIFFEL FOUNDRY

A SUBSTANTIAL Jobbing Foundry making castings from 10 cwts. to 30 tons are looking for an

ASSISTANT FOUNDRY MANAGER

with the following requirements:—

Practical moulding and coremaking experience.
Previous managerial experience.
Plenty of drive.
Ability to plan and control production.

Apply in writing to the SECRETARY, EIFFEL FOUNDRY CO. LTD., Moss Lane, Walkden, Lancs, stating previous experience and giving an idea of the salary required, bearing in mind the possibility of substantial advancement for an outstanding personality.

FOUNDRY MANAGER REQUIRED, able to work on own initiative and exercise efficient control of labour, metallurgy and output. Foundry production mainly machine tool castings up to 50-cwt. Good permanent and progressive position with pension scheme and housing available. Good salary and bonus for the right man with good experience and record. Reply in confidence: MANAGING DIRECTOR, Box FM884, FOUNDRY TRADE JOURNAL.

A FOUNDRY MANAGER is required for our light alloy sand foundry. The position needs a man of the highest calibre, with ability to control labour in an area where labour is short and experience of all modern production methods. Please state in your reply: age, experience, salary required. SLOUGH METALS LIMITED, Oxford Avenue, Trading Estate, Slough.

SITUATIONS VACANT—*contd.*

ASSISTANT WORKS MANAGER required by long established Engineering Public Company situated in the West Riding of Yorkshire. Must have sound technical knowledge and mechanised foundry experience in large scale production of pressure tight gun metal castings. Age 28/35. Pension and Life Assurance Schemes. Apply in confidence stating qualifications and present salary to Box AW899, FOUNDRY TRADE JOURNAL.

Existing personnel have been advised of this appointment.

FOUNDRY DEVELOPMENT METALLURGIST. Age approx. 25. H.N.C. or equivalent in Metallurgy or Chemistry. Work entails the development of Chemical/Metallurgical Materials for the Foundry Industry. Apply giving brief details to Personnel Dept. Box FD888, FOUNDRY TRADE JOURNAL.

WANTED—WORKS MANAGER for Steel foundry and engineering concern at Calcutta, manufacturing intricate steel castings for railways, sugar mills, etc., wg. up to 5 tons. Monthly production 500 tons. Machining 325 tons. Labour 2,000. Applicant must possess at least 10 years' experience in similar capacity, must be able to boost production, reduce rejection and administrative capacity. Write stating terms, Box WW890, FOUNDRY TRADE JOURNAL.

THIS advertisement for a FOUNDRY SUPERINTENDENT has been issued before but the vacancy has not been filled. Applications are again invited for this position. Applicants should have first class technical ability and a practical knowledge of all aspects of High Grade Iron Foundry production including mechanised semi-mechanised, jobbing work from small to 15 tons in Drysand, Loam and CO_2 Process. Knowledge of Nodular Iron production also necessary.

Initiative and executive ability absolutely essential. Superannuation scheme available and assistance will be given with housing. Excellent prospects for the right man but only a first class foundryman with good knowledge of shop management should apply to:—

GENERAL MANAGER,
THE BUTTERLEY CO. LTD.,
Engineering Works,
Butterley, Derbys.

THOMAS POTTERTON LIMITED
EMSCOTE ROAD, WARWICK

have vacancies for

FOUNDRY

LABORATORY

TECHNICIANS

Men required for control of foundry sand, cast iron analysis and hot blast cupola work will be on a shift basis—6 a.m. to 2 p.m. and 2 p.m. to 10 p.m.

ESTIMATOR required for medium size Aluminium Foundry near Birmingham. Must be capable of calculating casting weights, and production costs from drawings. Salary £750 to £950, according to age and experience. Write with full details of previous experence in confidence to Box ER880, FOUNDRY TRADE JOURNAL.

TWO EXPERIENCED SALES REPRESENTATIVES

Required for Prominent

LIGHT ALLOY FOUNDRY

Situated in the Midlands

Applications are invited from men aged 30/40 who have had previous experience in this rather specialised trade. Both appointments offer responsible and interesting work for individuals possessing the necessary energy and a pleasing personality.

Knowledge of the Light Alloy Foundry industry will be considered an advantage.

Car will be provided and an excellent superannuation scheme is in force.

One representative is required to cover territory in Southern England and the other in the Midlands.

Four-figure salaries are offered for both appointments, but higher level will depend on the ability and experience of successful candidate.

Full details, which will be treated in the strictest confidence, to:

BOX T.E.900, FOUNDRY TRADE JOURNAL

SITUATIONS VACANT—*contd.*

APPLICATIONS invited for position of MANAGER, embracing Ferrous and Non-ferrous Foundries, combined melt 100 tons, situated in Lancashire. In addition to a wide foundry knowledge, including up-to-date mechanisation, applicant's ability should cover utilisation and control of foundry personnel, time assessment, and control of metals to conform to all B.S.S. Specifications. This is a Top Line Job and calls for a disciplinarian of the highest calibre, capable of blending existing units into an efficient organisation. Write with confidence, submitting details of age, experience, qualifications, and salary required, to Box AI877, FOUNDRY TRADE JOURNAL.

EDUCATIONAL

Middlesbrough Education Committee

CONSTANTINE TECHNICAL COLLEGE

Principal: J. Houghton, B.Sc., Ph.D., A.M.I.Mech.E., A.F.R.Ae.S.

DIPLOMA IN PATTERNMAKING AND FOUNDRY TECHNOLOGY

Applications are invited for admission to the two year full-time Diploma Course in Patternmaking and Foundry Technology. The course gives a comprehensive training in patternmaking and foundry technology following which successful students will be considered by the National Foundry College for exemption from Part I of their Diploma Course providing the conditions regarding industrial training are satisfied.

Candidates should be of Intermediate City and Guilds or equivalent standard in either Patternmaking or Foundry Technology.

Full particulars may be obtained on application to the

HEAD OF THE DEPARTMENT OF METALLURGY, CONSTANTINE TECHNICAL COLLEGE, MIDDLESBROUGH.

BUSINESS WANTED

REQUIRED to purchase. Small-med. Non-ferrous Foundry in or around London area. Box RT849, FOUNDRY TRADE JOURNAL.

BUSINESS FOR SALE

Brightwell, Nr. Wallingford, Berks

FIRST-CLASS Business of Car Spring Specialists and General Iron Workers. Modern brick and asbestos roofed Forge with Office. Also modern brick and tiled BUNGALOW, 2 bed; sitting room; kitchen; bathroom, etc. Room for expansion. Price including Premises, Goodwill and Stock-in-trade, £10,000. Full particulars of FRANKLIN & GALE, Estate Agents, Wallingford. (Phone 2240.)

BUSINESS OPPORTUNITIES

JOBBING IRONFOUNDING AND ENGINEERING

Old established but modern works in prosperous Lancashire town.
Well situated and substantial freehold land and property. Area of land 6/7,000 square yards.
Regular trade with varied long standing connections. High quality irons. Capable of expansion. Foundry capacity 15 tons weekly plus.
Recent Valuations. Majority of shareholders wish to retire on account of age. Taxation loss available. Amalgamation with public company would be considered.

Replies from principals or solicitors to

E. & B. HAWORTH & NUTTALL, Solicitors,
7, Lord Street West Blackburn, Lancs.
Tel.: 4386/7.

MACHINERY WANTED

WANTED. Two Cupola Furnaces, approximately 5 ft. or 6 ft. outside dia. Preferably with spark arrestor, fan, motors and starters. Please state full particulars MESSRS. J. C. HULSE & CO. LTD., Hinkshay Road, Dawley, Shropshire.

Cleveland Plant and Machinery Co., Ltd.,

want your

Surplus Foundry Plant and Forging Equipment

Best prices given

Wharncliffe House
44 Bank Street
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Tel. No. 29051

URGENTLY WANTED: Pneulec Royer size No. 1, in any condition, even a scrap machine acceptable. Box UW892, FOUNDRY TRADE JOURNAL.

MACHINERY FOR SALE

Titan Coreblower, 75 lbs. capacitty Almost new.
Saw Sharpening machine. Cheap.
Abrasive Development Aqua-Spray, wet type Blast Machine. Almost new.
Large and Standard size Adaptable Moulding machines.
Modern Rumbling Barrel, 6ft. by 3ft.
Large stock of geared Ladles up to 8 tons capacity. List on request.
Few Roper Ladles and Roper Ladle Hoists, 3- and 5-cwt. capacity.
New Bale-out and Lift-out Furnaces. Please send for illustrated leaflets.
Monometer 800 lb. Aluminium capacity Rotary Furnace.
Large stock of small moulding Boxes at low prices to clear. List on request.
Several Cummings coke-fired Furnaces.
Cummings oil Sand Mixer.
Two Pneulec Jolt Squeeze Moulding machines.
Morgan tilting furnace, type C.A. 400 lbs. capacity, complete with burner and fan.
200 assorted Keith Blackman fans.
Lathe, 5in. all geared head. £50.

ELECTROGENERATORS LTD.
Australia Road, Slough, Bucks.
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LADLES
STOCK UP TO 5TON CAP.
E. A. ROPER & CO. LTD.
KEIGHLEY • Phone: 4215-6

MACHINERY FOR SALE—*contd.*

SALE OF SURPLUS PLANT AND EQUIPMENT

ONE Contractors' Hand Operated 3F Diaphragm Pump, mounted on Hand Trolley.
One C.O.2 Manifold for 8 C.O.2 Bottles, 8 Outlets complete with pressure regulator and Electric Heater for C.O.2 Core Practice.
One Pneulec Sand Royer with spare belts. Requires slight attention.
One B.M.M. SF.1 Moulding Machine as new, unused.
One Morrisflex Double ended Polishing spindle complete with backstands for use with Abrasive Belts, Driving Wheels 10 in. dia., 4 in. wide, as new, little used.
One E.M.B. No. 16 Airdraulic Press. 16 ton capacity.
One 0-10 Ton Avery Hydraulic Tensile Test Bar Testing Machine complete with grips.
Three 90 deg. Roller Track Bends, 5 ft. radius, 3 in. dia. Rollers, 16 in. wide.
Twenty-six 8 ft. Straight Lengths Roller Track, 3 in. dia. Rollers. 16 in. wide.
One Fordath continuous Bench Core Extruder complete with Twin Dies for ½ in. dia., 1 in. dia., 1½ in. dia. Cores—as new.
Quantity of 2 phase 200 v. and 3 phase 400 v. Electric Motors mostly Squirrel Cage. In good order and scrap.
Ten Aircraft Jacks, Hydraulic.
One 2½ ton 6 ft. × 4 ft. Foundry Knockout complete with totally enclosed Motor, Pit Framework, Hopper, and 20 ft. centres 24 in. wide inclined enclosed surge belt. In good order.
One secondhand Greens Cupola with dry spark arrester 3 ft. 6 in. lined dia. in melting zone.
One 42 ft. long, 3 ft. 6 in. internal dia. Cupola suitable for lining to 2 ft. or 2 ft. 6 in. dia. Separate windbelt with 4 Tuyere valves and Peep Holes.
One Polygram Simplex Shell Mould Maker, gas heated. Little used.
One Twin Polygram Mould Closer.
One 10,000 C.F.M. 32 in. W.G. Pressure Cupola Fan on base plate direct coupled to 60 H.P. totally enclosed Motor, 400/3/50, with S.D. Starter, suitable large Cupola—unused.
One Birlec 200 K.V.A. Electric Annealing Furnace, 5 ton load, 1,000 deg. C. Internal dimensions 18 ft. deep, 3 ft. wide × 2 ft.—2 ft. 6 in. high.
One Hind Griffiths 200 K.V.A. Electric Annealing Furnace. 5 ton load, 1,000 deg. C. Internal Dimensions 18 ft. deep, 3 ft. wide × 2 ft. × 2 ft. 6 in. high.
One set Triple Rolls for sheet Metal, 4 ft. long, 3 in. dia. Rollers, geared hand drive, little used, by Morgan of Lye.
One Birlec Heat Treatment Furnace 0 deg. C.—1,000 deg. C. Type SA40 27 KW. 400/3/50 with gas curtain Equipment. Suitable for Tool Hardening etc. approximate sizes 2 ft. wide × 4 ft. deep × 18 in. high. Balanced Vertical Lifting Door.
Three Steel Trusses 32 ft. span, height to apex 7 ft. approx. In good order.
Five Steel Trusses 42 ft. span, height to apex 7 ft. approx. In good order.
One B4 Linisher, suit wood or metal, Belt 8 in. wide 2 ft. centres of 5 in. dia. Rollers.

THE BROCKMOOR FOUNDRY CO. LTD.
Brockmoor, Brierley Hill, Staffs.
Telephone: Brierley Hill 77026 (4 lines)

TWO—Heenan & Froude Type P.66 Oil Cooler Units, complete in all details. Condition unused.
Four—Temperature Control Panels, each panel fitted three edgeways temperature indicators, and one combined indicator and recorder. Range: Zero/750 deg. C. and Zero/1,000 deg. C.
Large quantity of Furnace Bricks and High Temperature Insulating Bricks.
WHITEFIELD MACHINERY & PLANT, LIMITED, 48, Chatham Street, Edgeley, Stockport, Cheshire.

MACHINERY FOR SALE—contd.

FOR SALE. One 2-ton Rotary type Copper-melting Furnace fired by pulverised fuel. Complete with "Atritor" pulveriser. Box FS897, FOUNDRY TRADE JOURNAL.

OVERHEAD ELECTRIC CRANE by Morris, 2 ton capacity, 2 girder, 37 ft. 4 in. span, all electric, cab control, can convert to pendant control. This crane is in first class order. Appy FRANK SALT & Co. LTD., Station Road, Blackheath.

FURNACES:

MORGAN Type C.A. Oil-fired 15-cwt. cap., with preheater, Blower, Pump, and Oil Storage Tank.
Bale-out 300-lb. cap. Oil-fired with Burner and motorised Blower.
Monometer Rotary: 1-ton and 2-ton cap.
Gas-fired, various makes: 100-, 150-, 300- and 400-lb. cap.

CUPOLETTES:

Davies 2 ft. 6 in. dia. shell 10/12-cwt. cap.
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850	E.C.C.	11 kV-433/240
750	E.C.C.	11 kV-3.3 kV
500	B.E.T.	11 kV-400/230
500	PARSONS	6.6 kV-3.3 kV
400	E.E.C.	11 kV-440/250
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Lees Hall Gas-fired Crucible Furnace, cap. ½-ton aluminium, complete with blower.
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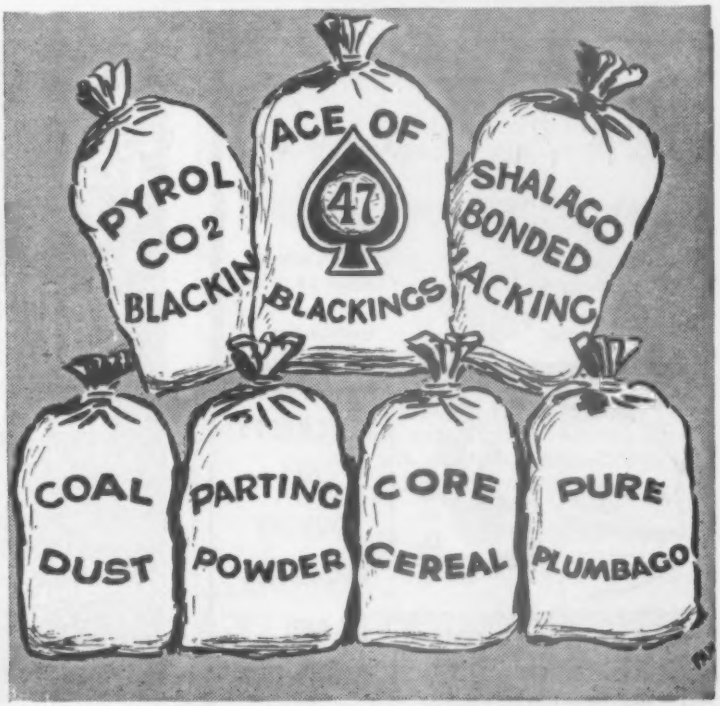

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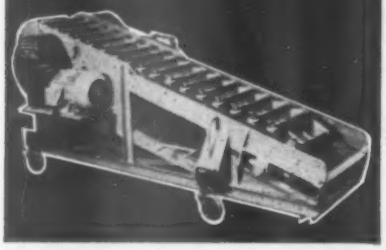

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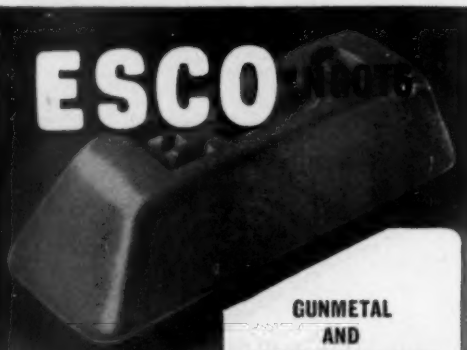
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